IN THE UNITED STATES DISTRICT COURT

FOR THE EASTERN DISTRICT OF NORTH CAROLINA

NORTHERN DIVISION

SEVERN PEANUT CO., INC.,
MEHERRIN AGRICULTURE &
CHEMICAL CO., and TRAVELERS
PROPERTY CASUALTY COMPANY OF
AMERICA as Subrogee of Severn
Peanut Co., Inc. and Meherrin
Agriculture & Chemical Co.,

Plaintiffs,

vs. DOCKET NO. 2:11-cv-00014-BO

INDUSTRIAL FUMIGANT CO. and
ROLLINS, INC.,

Defendants.

VIDEOTAPED DEPOSITION

OF

JOHN L. SCHUMACHER, P.E.

At Charlotte, North Carolina Reported by:
September 12, 2013 - 10:16 p.m. Susan S. Burgess, RMR

A P P E A R A N C E S

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Also Present:

Raleigh Ellison, Videographer

T A B L E O F C O N T E N T S

I, Susan S. Burgess, being a Certified Shorthand Reporter, Registered Merit Reporter, and Notary Public, was appointed Commissioner by consent to take the videotaped deposition of John Schumacher, P.E., September 12, 2013, at 10:16 a.m., in the offices of Quick, Widis & Nalibotsky, located at 2115 Rexford Road Suite 100, Charlotte, North Carolina.

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THE VIDEOGRAPHER: We're going on the record at 10:16 a.m. for the deposition of John Schumacher. This is being taken in the matter of Severn Peanut Company and Others versus Industrial Fumigant Company and Rollins, Inc. This is being heard in the U.S. District Court for the Eastern District of North Carolina, Northern Division; Docket No. 2:11-CV-00014-BO.

If the taking attorney would introduce themself for the audio record, please.

MR. EPSTEIN: Steve Epstein, representing the defendants.

THE VIDEOGRAPHER: Thank you.

Other counsel present, please introduce yourselves.

MR. GOLDSTEIN: Jay Goldstein, representing the plaintiffs.

THE VIDEOGRAPHER: Thank you.

Please swear the witness.

Whereupon,

JOHN SCHUMACHER, P.E.,

having first been duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. EPSTEIN:

**Q:** Good morning.

**A:** Good morning.

**Q:** Is it Mr. Schumacher?

**A:** Versus John?

**Q:** Doctor.

**A:** No, it's Mister.

**Q:** Okay.

**A:** Or John. Whatever you prefer.

**Q:** All right. Mr. Schumacher, my name is Steve Epstein. I am here to take -- here today to take your deposition in a case that has been filed against my clients, which include both Industrial Fumigant Company and Rollins, Inc., in a case involving a peanut fire at the Severn peanut dome. I take it you're very familiar with what we're here to talk about today.

Correct?

**A:** Yes.

**Q:** All right. Go ahead and state your name for

the record.

**A:** John Louis, L-o-u-i-s, Schumacher.

**Q:** And where do you live, Mr. Schumacher?

**A:** I live in Denver, Colorado.

**Q:** And what is your residential address?

**A:** It's 1149 South Clarkson Street.

**Q:** And that's where?

**A:** It's in Denver.

**Q:** Okay. Mr. Schumacher, I'm going to present you a check made payable to AEI, which is your company, correct?

**A:** Yes.

**Q:** Is that what you asked for in order for me to take your deposition today?

**A:** That's correct.

**Q:** Is that in the amount that you asked for today?

**A:** I haven't done the math, but I mean, it looks to be correct, so --

**Q:** Okay.

**A:** I'm sorry. I'm not --

**Q:** Excellent. I'm going to go ahead and hand you what we've marked as Exhibit 246. Can you take a look at that, please, and make sure you understand what it is.

**A:** Certainly.

[EXHIBIT NO. 246 MARKED FOR IDENTIFICATION]

THE WITNESS: Okay.

BY MR. EPSTEIN:

**Q:** Can you identify what Exhibit 246 is?

**A:** Exhibit 246 is the engineering investigation report that I prepared on April 30th, 2013, along with the attachments.

**Q:** Okay. Is this your expert report in the case that we're here to talk about today?

**A:** Yes.

**Q:** All right. I want to ask you some questions about your background, which I will note is at the end of your report following your signature page. It's about 15 pages in.

**A:** Are you referring to my CV or resume?

**Q:** Yes.

**A:** Okay.

**Q:** All right. So I want to start by asking you how long it took for you to get your chemical engineering degree from the University of Illinois?

**A:** Four years.

**Q:** All right. What was your GPA in those four years?

**A:** I think it was about 3.8.

**Q:** Okay. What was your class rank, approximately?

**A:** No idea.

**Q:** Okay. Did you fail any courses in college?

**A:** I did not.

**Q:** You then proceeded to get a master's in chemical engineering from the Illinois Institute of Technology; is that right?

**A:** I did, yes.

**Q:** Okay. How long did that take?

**A:** Oh, I think I was taking that at night. So from '92 to -- maybe about four years, three years, three and a half years.

**Q:** Okay. You worked at Packer Engineering during that period of time, correct?

**A:** Did you say I worked?

**Q:** Yes.

**A:** Yes.

**Q:** Okay. And what was your job at Packer Engineering?

**A:** Well, as it's listed here, I was a staff chemical engineer.

**Q:** Okay. For what reason did that employment come to an end in 1998?

**A:** The mountains were calling.

**Q:** Okay. Did you resign? Were you fired?

**A:** No, no. I -- I resigned and got a job in Denver.

**Q:** Okay. You then worked for the Western Engineering and Research Corporation, correct?

**A:** That's correct.

**Q:** What was your job there?

**A:** Project engineer.

**Q:** And for what reason did your employment there end in 2005?

**A:** Basically the president -- well, there were two owners of that company, Jay Freeman and Jim Royston, and they had a philosophical disagreement. And we decided to form AEI corporation. And Jim Royston bought the name Western from Jay. So it was -- I went with a guy and left the company.

**Q:** Okay. And who did you go with?

**A:** Jay Freeman.

**Q:** Okay. All right. Mr. Schumacher, do you have any education, training, or experience in the field of agricultural engineering?

**A:** Well, from the standpoint of commodities and how they can self-heat, yes.

**Q:** Okay. I'm asking about agricultural

engineering. Do you have a degree in agricultural engineering?

**A:** A degree, no.

**Q:** Did -- during your college education, did you have a minor in agricultural engineering?

**A:** Agricultural engineering?

**Q:** Yes.

**A:** No.

**Q:** Did you take courses in agricultural engineering while you were in college?

**A:** Well, I took a bunch of chemistry courses and things of that nature that would be related to some of what ag engineering's about. And a lot of the courses that I took overlapped with ag engineering.

**Q:** Okay. Are you an agricultural engineer?

**A:** No. I think I answered that.

**Q:** Okay. For your master's degree, were you taking courses in agricultural engineering?

**A:** No, I was not.

**Q:** Do you have any education, training, or experience in the field of biosystems engineering?

**A:** I'm trying to think. I think I took a course on biochemical -- a biochemical engineering course, undergraduate.

**Q:** Apart from that, do you have education,

training, or experience in the field of biosystems engineering?

**A:** No, not specifically biosystems engineering, but as it relates to how commodities self-heat, I would say I have some experience with that.

**Q:** Do you have any education, training, or experience in the field of crop science?

**A:** Crop science, to me, is like how you grow plants and things like that. So from the standpoint of growing plants, no.

**Q:** And I'm talking about commodities as well as plants. Do you have any experience in the field of growing and storing commodities?

**A:** Storing from the standpoint of how they self-heat.

**Q:** But not in terms of the actual practices that are followed by food processors in the storing of agricultural commodities?

**A:** I mean, I have some -- some familiarity with that, yes.

**Q:** Okay. I'm focused on education, training, and experience as opposed to familiarity, okay, which I'll explain to you in my mind is different. Something which you learned either on the job or through classroom experience.

Do you have education, training, or experience regarding the processes that are followed by food processors in the storing of commodities?

**A:** From the standpoint of how commodities are stored and how that relates to self-heating, I have experience with that.

**Q:** All right. Have you ever had any classroom instruction devoted specifically to aluminum phosphide?

**A:** Aluminum phosphide, not specifically, but obviously that's a chemical that I have a lot of training in.

**Q:** Okay. I'm specifically focused on classroom instruction. Have you had any classroom instruction on the topic of aluminum phosphide?

**A:** I don't think so, no.

**Q:** Have you had any classroom instruction specifically devoted to phosphine gas?

**A:** Classroom instruction? I don't think -- no, not on phosphine gas.

**Q:** Have you had any classroom instruction specifically devoted to the spontaneous ignition of phosphine gas?

**A:** Not specifically phosphine gas, no.

**Q:** Have you had any classroom instruction specifically devoted to forensic chemistry?

**A:** Well, I would say all my chemistry, my chemical background, my chemistry courses are directly related to that, so yes.

**Q:** I'm specifically asking about a course devoted to the topic of forensic chemistry.

**A:** Yeah. I've taken training at the International Association of Arson Investigators where I've actually spoken, not necessarily on that topic, but I have taken training that relate -- regarding forensic chemistry.

**Q:** All right. I want to shift focus now to the fire investigations that you have participated in over the course of your career, all right?

**A:** Okay.

**Q:** My guess is, because you testify a good bit, you have had to answer the question that I'm going to ask you, which is, can you approximate the number of fire investigations that you have participated in to date?

**A:** Can't give you a specific number, but it's several hundred.

**Q:** Okay. More than 500?

**A:** I would think 500 is about the highest for fire investigations.

**Q:** Correct. Okay. Well, of those approximately 500 -- I'm not going to hold you to the number --

approximately how many involved a peanut storage warehouse?
**A:** This would be the first.
**Q:** Very first one?
**A:** Yes.
**Q:** Okay. Approximately how many involved a warehouse storing any type of agricultural commodity?
**A:** I would say half a dozen to a dozen.
**Q:** So 6 to 12?
**A:** That would be an estimate, yes.
**Q:** About how many of those investigations did you conclude that self-heating or spontaneous combustion played a role in the development of the fire?
**A:** I don't remember all of the conclusions in those cases, but I remember one involving hay where I thought that that was the likely the cause.
**Q:** So as you sit there right now, you can remember, of your 500 fire investigations, one in which your conclusion was that self-heating was responsible for the fire?
**A:** That's not what you asked me.
**Q:** I'm sorry. You're right. I'll be more specific. As you sit there right now, you can think of one fire investigation that involved a stored commodity in which your conclusion was that self-heating was the

cause of the fire?

**A:** That's right off the top of my head.

**Q:** What causes spontaneous combustion or self-heating in a stored agricultural commodity?

MR. GOLDSTEIN: Objection.

You can answer.

THE WITNESS: You're referring to the process --

BY MR. EPSTEIN:

**Q:** Yes.

**A:** -- that can lead to --

**Q:** Yes.

**A:** -- potential self-heating to ignition?

Well, it's in phases, and the first phase is typically biological heating. And that gets you to a certain temperature, at which point the heating can stop. If it doesn't stop, then you have oxidated heating, which then can continue to the point of thermal runaway. And that thermal runaway allows you to get to the point where the autoignition temperature of that particular commodity is reached.

**Q:** Would you agree with me that once thermal runaway commences, unless something is done to stop it, you will get to ignition?

**A:** If you reach thermal runaway?

**Q:** Yes.

**A:** It's possible that you will reach ignition, yes.

**Q:** Well, in fact, the definition of thermal runaway is, unless that process is interrupted, you will get to ignition, correct?

**A:** Generally, I would agree with it, yes.

**Q:** So investigating a stored agricultural commodity that had a fire, if you concluded, one, that there was thermal runaway and, two, that there was nothing done to interrupt that thermal runaway, it would be your conclusion that self-heating led to the fire, correct? I'm sorry. Bad question.

**A:** Yeah. That's --

**Q:** Let me strike again.

If you concluded that thermal runaway had occurred as the result of a self-heating biological process and that nothing was done prior to the fire to interrupt that thermal runaway, it would naturally then be your conclusion that the self-heating process that preceded the thermal runaway is what led to the fire?

**A:** So in this -- in this hypothetical, you're talking about a fire where I've investigated it, and I've eliminated all other ignition sources, other ignition scenarios, and I'm evaluating self-heating to ignition as

a potential cause, and if I determine that thermal runaway in fact occurred, nothing stopped it, would that be the cause?

**Q:** Yes.

**A:** I mean, if I've evaluated everything and that's what I'm left with, then I would agree with you.

**Q:** So really what you're trying to determine in terms of whether or not spontaneous combustion played a role in the fire is whether or not thermal runaway commenced?

**A:** Well, that's -- that's part of it, certainly. There's a lot of other stuff that goes into investigating a fire, not just, "Okay. Do I have thermal runaway?" You have to be able to get to the point where you can establish that that is, in fact, the cause with all the other information that's out there.

**Q:** Okay. I'm -- I'm asking about one specific hypothesis, that being self-heating. And as you're evaluating that hypothesis, if you conclude that there was thermal runaway that followed a self-heating process, then, at the very least, you would not be able to eliminate self-heating as a cause of the fire.

Would you agree with that?

MR. GOLDSTEIN: Objection.

THE WITNESS: Well, if I've concluded

that thermal runaway occurred, that's one step, but then you have to determine is there something that's stopping that thermal runaway from occurring. And if I can get to the point where I can say, "Yes. This is not going to be stopped," then I would say, "Yes, I would agree that that's likely the cause." That's the only one I'm left with and I'm looking at.

BY MR. EPSTEIN:

**Q:** Are there characteristics of stored agricultural commodities that make them prone to self-heating?

**A:** Well, yes, they're -- they're organic. They can char. They usually are somewhat porous. They are -- they can be moist. Usually stored in large quantities.

**Q:** Anything else?

**A:** I mean, off the top of my head, that's generally what I -- what I see.

**Q:** Going back to your CV, looking at the --

**A:** My what?

**Q:** Your CV.

**A:** CV. Sorry.

**Q:** Looking at the section on your experience.

**A:** Yes.

**Q:** You indicate that you have investigated "hundreds of fires and explosions in residences,

commercial and industrial buildings, and chemical plants."

I take it you didn't list agricultural warehouses there because that's been a very small fraction of what you've done, correct?

**A:** No. I didn't list that because that would be potentially a commercial or industrial type of incident as I describe it.

**Q:** Okay.

**A:** I'm not limiting it to, you know, buildings. That's -- to me, an agricultural building would be one of those.

**Q:** All right. So as you view it, the Severn peanut dome would fit within what you have in your first sentence there?

**A:** Yes. I mean, in the general term, I think "ag facility" is a more specific term, but I think, as I wrote that, that's -- encompasses all those types of investigations that I'm talking about.

**Q:** All right. Your next sentence says, "Many of these losses have involved propane, natural gas, and flammable liquids."

Would you agree we're not here to talk about any of those subjects today?

**A:** I would disagree.

**Q:** We are here to talk about propane, natural gas, and flammable liquids?

**A:** I'm sorry. I was -- flammable -- flammable gas. It's not listed there. I saw flammable liquids, but you're right. In that sentence, that's correct. But specifically I'm talking about propane, natural gas systems which is a -- they are flammable gases, and we're talking about flammable gas here.

**Q:** You have very specific experience regarding the -- the gas of propane and natural gas, not regarding phosphine, correct?

**A:** Well, I think I have a lot of experience with propane and natural gas, but I certainly have experience with phosphine gas.

**Q:** Not enough to list in your experience on your CV, correct?

**A:** Well, I didn't list all the other gases like acetylene and ethylene and ethylene oxide and all the other gases I've dealt with over my career.

**Q:** You listed the two gases with which you have the most experience, which are propane and natural gas, correct?

**A:** We do a lot of investigation related to those two gases, but it doesn't mean I don't have experience with phosphine gas.

**Q:** And in contrast, you don't do a lot of investigation in relation to phosphine gas, correct?
**A:** I mean, define "a lot." I've done, I think, three cases on this -- on phosphine gas.
**Q:** Okay. Three out of about 500, right?
**A:** Yeah.
**Q:** Okay. It says that you have "extensive experience with propane and natural gas systems and their components such as regulators, relief valves, control valves, and appliances."
Would you agree we're not here today to talk about any of that?
**A:** That's correct.
**Q:** It next says that you have "substantial experience with propane odorant," in paren, "(ethyl mercaptan) and its properties."
Would you agree that we're not here today to talk about any of that?
**A:** That's correct.
**Q:** It then says, "Additionally, Mr. Schumacher has investigated many carbon monoxide and chemical-related incidents and has investigated accidents in the chemical process industry."
Would you agree we're not here today to talk about the chemical process industry?

**A:** No; but we're here to talk about chemical-related incidents, and we're here to talk about chemistry in general.

**Q:** All right. Not here today to talk about carbon monoxide incidents, correct?

**A:** No; but that's a gas.

**Q:** Next paragraph says that "Mr. Schumacher has evaluated the flammability characteristics of liquids, powders, plastic, and building materials."

Would you agree that we're not here today to talk about any of that?

**A:** Well, powders are a solid granular material, and I would say peanuts and commodity -- commodities, in general, would fall under the same concept. So I would say powders would be closely related to that.

**Q:** Peanuts are powders; is that what you're saying?

**A:** I'm talking about solid granular material.

**Q:** You believe peanuts fall somewhere within the definition of powders, as you have listed there in the first sentence of the second paragraph, in your experience?

**A:** I didn't say that it would fall within the definition of powders, but I'm telling you that powders are granular materials, and we're dealing with peanuts

and other commodities that are gran- -- that are solid materials.

**Q:** Is it your thought that peanuts are granular materials?

**A:** No. They're solid material. Granulars are solid material, and it's just more finely divided material, but it's a solid, like peanuts.

**Q:** Of the 6 to 12 storage warehouses that were storing commodities in which you participated in a fire investigation, how many of those, if any, involve the application of a pesticide to a stored agricultural commodity?

**A:** I think three involved the pesticide and one or two of them involved something like a Sprout Nip for potatoes.

**Q:** Okay. Can you tell me so we're -- that's about 5 out of the 12, correct, involve some form of pesticide application, correct?

**A:** Yes.

**Q:** Can you tell me the number of those five that involve the application of a pesticide onto the surface of the stored commodity?

**A:** I think two of them did.

**Q:** Two apart from this case?

**A:** No; including this case. I'm sorry.

**Q:** Okay. So one other time in your career have you investigated a fire in which a pesticide was applied to the surface of a stored agricultural commodity?

**A:** Now, if we're talking about aluminum phosphide, that would be correct. If you're talking about like the Sprout Nip material, then that would be two more.

**Q:** Okay. So if you classify the Sprout Nip material as a pesticide, it was applied to the surface of the commodity at issue there?

**A:** Yes.

**Q:** And what was the commodity at issue in that case?

**A:** Potatoes.

**Q:** Okay. And the other one that you've mentioned would be what? What -- what was applied to the surface of what?

**A:** When you say the other one --

**Q:** I thought you said that there were two others besides this case, if you include the Sprout Nip applied to the potatoes, in which a pesticide was applied to the surface of an agricultural commodity.

**A:** No. I don't think we're communicating. Two were the Sprout Nip on the potatoes.

**Q:** Okay.

**A:** One other was -- besides this case, was applied to the surface of a commodity.

**Q:** And one of those was Sprout Nip? And that was Sprout Nip?

**A:** No.

**Q:** Okay.

**A:** Two -- two Sprout Nip, two aluminum phosphide, one of which was Severn.

**Q:** Okay. So there was one other fire investigation that you performed in which aluminum phosphide was applied to the surface of a stored agricultural commodity?

**A:** Yes.

**Q:** And what was that stored agricultural commodity?

**A:** That was wheat.

**Q:** And is that the subject of the article that you co-wrote in -- was that the subject of an article that you co-wrote, that other one?

**A:** Yes.

**Q:** Okay. We'll get to that.

What year was that investigation approximately, the one that involved the application of aluminum phosphide to the surface of a wheat pile?

**A:** I don't -- I don't recall.

**Q:** Was it within the last five years?
**A:** Yes.
**Q:** Okay.
**A:** I believe that's correct.
**Q:** Who owned that facility?
**A:** I don't remember.
**Q:** Okay. When you think about that investigation, what name do you associate with that investigation?
**A:** I don't have a name. It's -- if I could tell you that, then I would.
**Q:** Okay. And your investigation in that matter preceded your investigation in this matter; is that correct?
**A:** Yes.
**Q:** All right. So this is, the Severn Peanut case, the second time in your career that you have investigated a fire that followed the surface application of aluminum phosphide to an agricultural commodity, correct?
**A:** Yes.
**Q:** All right. This is also the second time in your career that you concluded the misapplication of aluminum phosphide to the surface of agriculture -- to the surface of an agricultural commodity was the cause of

the fire to that agricultural commodity, correct?

**A:** No.

**Q:** You didn't make that conclusion in the wheat case?

**A:** No.

**Q:** Okay. What was your conclusion in the wheat case?

**A:** It was surface and subsurface. It was a subsurface issue. So really related to the cause. That was not surface.

**Q:** It was the probing that you concluded in that case that was the misapplication that caused the fire?

**A:** Yes.

**Q:** Okay. So let me back up and see if I've got this right. The Severn Peanut case is the first fire investigation in which you have concluded that the surface application of aluminum phosphide resulted in a fire?

**A:** That's correct.

**Q:** How many times have you been qualified as an expert witness in a court of law? Again, approximately, if you don't have an exact number.

**A:** I'm going to say a dozen, 12 times, about.

**Q:** Has that ever occurred in a federal court?

**A:** Yes.

**Q:** Okay. Can you tell me the federal courts in which you have been qualified to testify as an expert witness?

**A:** Well, the one that I recall was in Denver. I can't tell you the --

**Q:** Federal District Court in Denver?

**A:** Yes. I guess that's the best way to say it.

**Q:** Approximately when was that?

**A:** Oh, ten years ago.

**Q:** What were you qualified to give opinion testimony regarding?

**A:** The origin and cause of a fire.

**Q:** Was that a civil case or a criminal case?

**A:** Civil.

**Q:** And what was the nature of the fire? Where did it occur?

**A:** It occurred in a grocery store.

**Q:** For whom were you testifying in that case?

**A:** I think the grocery store, basically.

**Q:** What was your opinion as to the origin and cause of that fire?

**A:** It was in the dropped ceiling area as a result of hot work that was being performed near some paper-backed insulation.

**Q:** And in your entire career, that was the only time in which you have been qualified to provide opinion testimony in a federal court?

**A:** I don't know the answer to that. I'm not sure if some of the other ones are district -- federal courts or not. I'd have to take a look to answer that definitively.

**Q:** Well, first of all, let's go to your four-year testimony record, which is a few pages -- well, it's directly behind the last page of your CV. And I will tell you, I've looked through that four-year record, and there is no indication that you provided opinion testimony in a federal court during those four years. You can look through and tell me if I've misinterpreted your chart.

**A:** I don't know if United States District Court, Northern District of Illinois -- if that -- I guess I don't know how to interpret these.

**Q:** That is a federal court. Was that a deposition or a trial, though?

**A:** I think it was a depo- -- I'm sorry. It's a deposition. You're correct. So --

**Q:** You understand that judges don't qualify witnesses at a deposition like when we're here today?

**A:** No. I -- I do understand that, and I

apologize. That's -- that's correct.
**Q:** Okay.
**A:** But I don't know about the prior --
**Q:** Sure.
**A:** -- testimony record.
**Q:** All right. So here, in this chart, you show four occasions in which you testified in a court, the Fifth District in Minnesota on April 23rd, 2009; the 18th Judicial District in Montana in August of 2011; the Iowa District Court for Black Hawk County on December 6th, 2011; and the Johnston County Superior Court on March 14th, 2012, correct?
**A:** Yes.
**Q:** All right. The testimony in North Carolina was related to an explosion, correct?
**A:** Yes.
**Q:** The testimony in Iowa was related to an explosion, correct?
**A:** Flash fire. I think it was more of a flash fire.
**Q:** Okay. It's listed in your description as an explosion, correct?
**A:** What page -- where are we now?
**Q:** Page 2 of 2 in your testimony record.
**A:** Sure.

**Q:** It's the fourth line, the Firgard case, which is listed as an explosion in the description column, correct?

**A:** Yeah; but I think it's more accurately a flash fire.

**Q:** Okay. The Montana testimony involved carbon monoxide, correct?

That's also on the second page, second line.

**A:** Yes.

**Q:** And on the first page, the case in Minnesota that you testified in, in 2009, was an explosion case, correct?

**A:** Yes.

**Q:** I take it you have never been qualified to give opinion testimony regarding the origin and cause of a fire that occurred to an agricultural commodity in a store -- in a storage warehouse?

**A:** That's correct.

**Q:** This would be the first time in your career you're looking to be qualified to provide opinion testimony regarding the -- the origin and cause of a fire in a -- in a storage warehouse of an agricultural commodity?

**A:** Can you --

**Q:** Sure.
**A:** -- say that again?
**Q:** This would be the first time in your career you're seeking to be qualified as an expert witness to give opinion testimony as to the origin and cause of a fire to a stored agricultural commodity in a warehouse?
**A:** I think that's correct.
**Q:** Okay. And would this also be the first time in your career that you're seeking to be qualified to provide opinion testimony as to a pesticide causing a fire?
**A:** I believe that's correct.
**Q:** Those are two topics that you've never testified about in court before, correct?
**A:** In court, correct.
**Q:** Have you provided deposition testimony about those topics before today?
**A:** Yes.
**Q:** Okay. Tell me when.
**A:** It would have been the case --
**Q:** The wheat case?
**A:** Yes.
**Q:** Is that wheat case listed in this chart anywhere?
**A:** Let me take a look here.

Yes.

**Q:** Which one is it?

**A:** It's the one nine down from the top on page 1, 10676.

**Q:** So that occurred in Oklahoma?

**A:** Yes.

**Q:** Who is the attorney that you worked with in that case?

**A:** Jim Dendinger.

**Q:** Spell the last name.

**A:** D-e-n-d-i-n-g-e-r.

**Q:** Is he in Oklahoma?

**A:** I don't believe so.

**Q:** Where do you believe he is?

**A:** I think he's in Texas.

**Q:** Do you recall the name of his firm?

**A:** I believe it's Cozen O'Connor.

**Q:** Do you recall the name of the defense attorney in that case?

**A:** I don't.

**Q:** That case never went to trial, as far as you know?

**A:** That's correct.

**Q:** Do you have a copy of your deposition in that case?

**A:** I don't know. I may have it.
**Q:** Did you once review your deposition testimony?
**A:** Yeah; but I usually get rid of them.
**Q:** So that attorneys like me don't ask you for them?
**A:** Well, just -- we purge the file, stuff we don't need to keep.
**Q:** Okay. This deposition occurred less than three years ago. Do you think you purged it if it was less than three years ago?
**A:** I would have purged it, sure, but I've seen it recently.
**Q:** Okay. If I ask you to try and find it, provide it to Mr. Widis so that I can take a look at it, would you have any objection to doing that?
**A:** No; as long as he requests that of me.
**Q:** Okay. I am going to request that of you. It will be up to you as to whether you get it to him and up to him as to whether he gets it to me.
MR. EPSTEIN: And I'll follow that up, Howard, with an e-mail.
**Q:** What was the type of aluminum phosphide used in that case or brand name?
**A:** I don't remember if it's Weevil-Cide or

Fumitoxin, to be honest.
**Q:** Was it tablets or pellets or both?
**A:** It's tablets.
**Q:** What was the size of the storage warehouse?
**A:** I don't have that information off the top of my head.
**Q:** Was it an application that at least partially occurred by scattering the tablets from above the surface of the commodity? Was that --
**A:** No, no.
**Q:** That wasn't part of it at all?
**A:** No, not at all.
**Q:** It was all probed?
**A:** It was probed, but they were scattering on the surface while they were inside the container.
**Q:** Okay. So some of the tablets wound up on the surface, and some of them wound up subsurface?
**A:** Right. The majority were subsurface.
**Q:** From the date of that application until the fire was discovered, what was that time period, approximately?
**A:** I don't remember the number.
**Q:** Did you prepare an expert report in that case?
**A:** I did.

**Q:** Would you still maintain a copy of that expert report?

**A:** I'd have to check.

**Q:** I'm going to ask you to do that, and I'm going to ask Mr. Widis for that as well after this deposition is over.

Your deposition was in November of 2010. When do you believe you were engaged in that matter? About a year before? Two years before?

**A:** What year -- say that again. I'm sorry. I missed --

**Q:** Your deposition was November 29th, 2010, in the Planter's Cooperative Association versus Ken's Pest Control case. My question to you is, approximately how much earlier than that do you believe you were retained or engaged?

**A:** I don't know, but I would -- I would estimate a year.

**Q:** Were you actually there when the fire was occurring?

**A:** I was there when they were doing salvage.

**Q:** Okay. Prior to 2009, had you ever read any applicator's instructions or manuals regarding the use of aluminum phosphide?

**A:** No.

**Q:** So 2009 is the very first time you read materials produced by a manufacturer or distributor of aluminum phosphide regarding its proper application and use?

**A:** That's correct.

**Q:** And 2009 is the first time when you became aware of potential fire hazards associated with the use of aluminum phosphide; is that correct?

**A:** That's correct.

**Q:** All right. So you've had that knowledge for about four years, maybe three?

**A:** Maybe five. I don't remember the dates, so --

**Q:** Okay.

**A:** Yeah.

**Q:** Your expert report would indicate when you were engaged in that matter, correct?

**A:** It wouldn't indicate when I was engaged, but it would indicate when I wrote the report.

**Q:** Okay. All right. Mr. Schumacher, have you ever been challenged as an expert witness by opposing counsel? And if you want me to go into more details of what I mean by that, I will. But let me start by asking you if you've ever been challenged as an expert witness by opposing counsel.

**A:** I can only think of one time.
**Q:** When was that?
**A:** Well, I don't remember the date.
**Q:** Approximately --
**A:** It's been seven --
**Q:** -- five years?
**A:** No. It's been like seven years ago, maybe.
**Q:** Okay. What were court were you in?
**A:** Let me see if I have it on this sheet here.
It was in Iowa. I can tell you that. The case was in Iowa, but I don't see it on here.
**Q:** Was it a federal court or a state court?
**A:** I think it was state, but I don't know. Again, I don't know the cases preceding this list.
**Q:** Sure. What was the nature of the fire in that case?
**A:** It was a -- it was a flash fire in a residence.
**Q:** What was the nature of the challenge as to your testimony?
**A:** Well, the reason why it came about is that their experts were struck because they were -- their opinions weren't based on science, and so the only other tactic they had was to try to file a motion against us.
**Q:** All right. Do you recall what was said about

your proposed testimony in an effort to get you disqualified?

**A:** That it was wrong, I guess. I mean, I can't tell you anything more than that.

**Q:** Were you ultimately disqualified, or were you -- was the challenge ultimately denied?

**A:** Well, I don't think it went anywhere. The case settled.

**Q:** So there was no resolution of that, of the challenge to your testifying as an expert witness?

**A:** As I understand, that's correct.

**Q:** What attorney were you working with in that case?

**A:** Mark Ericson.

**Q:** Spell the last name.

**A:** I think it's E-r-i-c-s-o-n, but I'm -- I'm not sure.

**Q:** What state does he practice in?

**A:** Missouri.

**Q:** Do you know what city?

**A:** I believe Kansas City.

**Q:** Do you know what firm?

**A:** That, I cannot tell you.

**Q:** The defense lawyer -- well, were you representing -- were you working with the plaintiff in

that case?

**A:** No.

**Q:** You were working with the defendant?

**A:** That's correct.

**Q:** Do you recall who the plaintiff's lawyer was?

**A:** Do I recall who the plaintiff's --

**Q:** Who the plaintiff's lawyer was.

**A:** Don Beattie.

**Q:** Can you spell the last name?

**A:** I believe it's B-e-a-t-t-i-e.

**Q:** Do you know what city and state he practices in?

**A:** Des Moines, Iowa.

**Q:** Do you know what firm he's with?

**A:** I think it's the Beattie Law Firm.

**Q:** Okay. And it's your testimony here today that Mr. Beattie's challenge of you in Iowa is the only time in your career, as someone who has been involved in 500 or so fire investigations, in which you've been challenged as an expert witness in a court of law?

**A:** That's correct.

**Q:** Has any judge ever not permitted you to testify to an opinion you had intended to express?

**A:** No.

**Q:** Mr. Schumacher, are there books, treatises, monographs, or articles that you consider authoritative regarding the proper method to investigate the origin and cause of a fire?
**A:** Yes.
**Q:** Can you tell me what those are?
**A:** Well, the first one is NFPA 921, which I'm sure you have a copy of.
**Q:** Does that look familiar?
**A:** Yeah, it does. Okay. And then there are some others that are out there like Kirk's Fire Investigation, Fire Scene Reconstruction.
**Q:** Any others?
**A:** Those are the ones that come to mind.
**Q:** Is the Ignition Handbook something that you consider being an authoritative source?
**A:** That's -- yes. But, I mean, specific to what you asked me, it was regarding the -- more like the process.
**Q:** Okay.
**A:** If you want to get into other books, then we can talk.
**Q:** I will ask you the next question, which is --
**A:** Okay.
**Q:** -- are there books, treatises, monographs, or

articles that you consider authoritative regarding fire science?

**A:** Fire sci- -- okay. That's -- yes.

**Q:** Okay. Can you tell me what those are, in addition to the ones that you've already mentioned?

**A:** The Ignition Handbook, Fire Dynamics. There's a book by Quinterri [PHONETIC]. I'm trying to think of the name of it. SFP -- SFPE Handbook of Fire Protection Engineering.

**Q:** Any others?

**A:** Those are the ones that come to mind.

**Q:** Do you know who John Walker is?

**A:** I've met him recently.

**Q:** Okay. You have working side by side on a case together recently?

**A:** Yes.

**Q:** Okay. Is that your only experience with John Walker, to this date?

**A:** Yes.

**Q:** What did you think of him during the time that you were working side by side with him on that case?

**A:** I thought he was a pleasant guy.

**Q:** Do you think he knows something about fire?

**A:** This was an explosion, and I certainly know a

lot more about explosions than he does. But I don't know him regarding fires.

**Q:** Do you know his reputation?

**A:** I don't.

**Q:** You, in your report, indicate that you considered the 2011 version of NFPA 921 to be the applicable version. I'm curious as to why you concluded that the 2011 version was applicable to a 2009 fire.

**A:** Well, I mean, when I got brought in, I think it was 2012. So from my standpoint, I was looking at the fire after 2008 edition.

**Q:** Are you aware that Lester Rich -- first of all, are you aware that Lester Rich has also been designated as an expert witness in this case?

**A:** Am I aware of that?

**Q:** Yes.

**A:** Yes.

**Q:** Are you aware that his expert -- well, let me ask you: Did you review his expert report at a point in time?

**A:** I did.

**Q:** Are you aware that he relied on the 2008 version of NFPA 921?

**A:** I'd have to look at it, but I think that's correct.

**Q:** Do you believe it's appropriate for multiple versions of NFPA 921 to be the guiding fire investigation source in this case?

MR. GOLDSTEIN: Objection.

THE WITNESS: I mean, I don't know how to answer that. You know, the premise behind NFPA 921 is a scientific method, and we both followed that.

BY MR. EPSTEIN:

**Q:** Sure.

**A:** And that's the most important part of the whole document, I believe.

**Q:** Okay. So you don't quarrel with his use of NFPA 921 2008 version?

**A:** No. He was there, I believe, whenever the fire was, '09. And that would have been the edition he would have been under at that time.

**Q:** Are you aware of any differences between NFPA 921 2008 version versus 2011 version that would relate in any way to the investigation of the origin and cause of the fire in this matter?

**A:** I'm not aware of any substantive changes. I think it's generally the same.

**Q:** You probably are going to want to have that Exhibit 246 close by, but I'm going to start showing you some other exhibits.

**A:** So you don't want this one back?
**Q:** Well, ultimately this nice lady will want that one back.
**A:** We're not -- we're not done with this yet?
**Q:** We'll probably be referring to it a few more times.
**A:** Okay.
**Q:** I'm going to show you what we're marking as Exhibit 247.
[EXHIBIT NO. 247 MARKED FOR IDENTIFICATION]
BY MR. EPSTEIN:
**Q:** Can you tell me what Exhibit 247 is?
**A:** Basically notes.
**Q:** All right. Are these taken in chronological order? In other words, is your -- are your earliest notes the ones on the first page and your most recent notes the one -- ones on the last page?
**A:** Yes.
**Q:** Okay. And the last two are called "telephone notes." Is the first set of notes not from a conversation you had on the telephone or is --
**A:** It's not a conversation on the telephone, no.
**Q:** Was it live and in person with somebody?
**A:** Yes.

**Q:** Okay. Who was it live and in person with?
**A:** This is a meeting that took place actually in this office.
**Q:** Okay. And who was at that meeting?
**A:** If I remember correctly, Lester Rich, John Cavaroc, Steve Brown, myself, Howard Widis. Hunter Quick might have been there for some time and maybe Al -- somebody's going to have to help me with his last name pronunciation.
**Q:** Nalibotsky.
**A:** There you go. Nalibotsky. He may have been there as well. And then there's one other person, and I don't remember who that was. I don't remember a name.
**Q:** Okay. Do you recall approximately when that took place?
**A:** I want to say -- well, I could look at invoices if you have them that would tell me.
**Q:** Okay.
[EXHIBIT NO. 248 MARKED FOR IDENTIFICATION]
BY MR. EPSTEIN:
**Q:** Showing you what's been marked as Exhibit 248.
**A:** It was on December 6th of 2012.
**Q:** Okay. And these were the notes that you took

at that meeting or after that meeting?

**A:** At that meeting.

**Q:** Okay. So you had already been engaged for about four months as of that time in this matter?

**A:** About four months, correct.

**Q:** And let's go back to that time that you got engaged. Apparently you had a telephone conference with Hunter Quick?

**A:** That's right.

**Q:** Had you previously worked with Hunter Quick on any matter?

**A:** No.

**Q:** Had you previously worked with anyone at this law firm on any matter?

**A:** No.

**Q:** This is the first time in your career you've worked with this law firm?

**A:** That's correct.

**Q:** Okay. From the point in time you had that conversation with Hunter Quick on August 3rd of 2012, what did you understand to be your assignment or engagement in this matter?

**A:** To determine the cause of the fire.

**Q:** Were you aware of the fire before you were called that day?

**A:** No.
**Q:** Did you become aware that there was another origin and cause investigator who was also retained to determine the cause of the fire, namely Lester Rich --
MR. GOLDSTEIN: Objection.
BY MR. EPSTEIN:
**Q:** -- as of August of 2012?
**A:** Did I learn in August of 2012 that Lester was working on this fire?
**Q:** Yes.
**A:** Yes; at some point, I did.
**Q:** Did you come to any understanding as to why you were also being asked to work on this fire in addition to him?
**A:** Yes.
**Q:** Okay. What was your understanding of why you were going to work on this fire in addition to him?
**A:** My expertise in chemistry and chemical engineering and those types of processes as well as the fact that I'm a CFI, certified fire investigator.
**Q:** And Mr. Rich is not?
**A:** Is not what?
**Q:** I'm asking you, is Mr. Rich not a certified fire investigator?
**A:** Oh, he is.

**Q:** Okay. Now, you weren't at the scene of the fire during the fire as you were in the wheat fire case, correct?

**A:** That's correct.

**Q:** Do you believe you were handicapped in some way or inhibited or impaired in some way in your ability to reach a valid scientific conclusion as to origin and cause of this fire because you weren't at the scene?

**A:** No.

**Q:** You've done that other times in your career, correct?

**A:** That's right.

**Q:** And a fire investigator with the proper information can come to a valid origin and cause determination without having been at the scene of the fire, correct?

**A:** Right. Proper information, well documented, et cetera, yes.

**Q:** And in fact, to this day, you have not been to Severn, North Carolina, where the peanut dome was once located, correct?

**A:** That's correct.

**Q:** And you feel perfectly comfortable expressing a scientific conclusion as to origin and cause of the fire, correct?

**A:** Yes.
**Q:** All right. Going back to your notes, was this kind of when you started getting specific information that was going to feed into your analysis, this meeting that occurred in December of 2012?
**A:** No.
**Q:** You had previously gotten information that you had already begun digesting?
**A:** Yes.
**Q:** Okay. What information had you received prior to December of 2012?
**A:** I believe deposition -- depositions from the various fact witnesses, what other -- whatever file material was there available to be reviewed related to the case.
**Q:** So some of this -- some of these notes that you have on the first page of Exhibit 247, you could possibly have already acquired that information from your prior reading?
**A:** Yes. I'm sure I did, and I was just trying to kind of put a chronological thing together.
**Q:** Okay.
**A:** Keep it -- keep it fresh in my mind.
**Q:** All right. Looking through your invoices, Exhibit 248, I notice you have, on September 25th, 2012,

a telephone conference with B, which I believe is Barry, Lindley.

**A:** Yes.

**Q:** For -- well, you had four hours on that day. I assume a portion of that was that telephone conference, correct?

**A:** Right; small portion.

**Q:** All right. What was the nature of your telephone conference with Barry Lindley?

**A:** Well, I think he had been to the scene and was consulting on the case. And so I just wanted to call him up and chat with him a little bit.

**Q:** Okay. Did you ever take notes regarding that telephone conference with Mr. Lindley?

**A:** I don't think so. Again, it wasn't very long. It was pretty short.

**Q:** Anything that you learned from him which eventually helps you form your opinion in this case?

**A:** I don't think anything specifically, no.

**Q:** Let me ask you: Does Exhibit 248 represent all of the invoices to date which you have sent to Quick, Widis & Nalibotsky?

**A:** Yes. Well, let me look at it, but I would have provided you with all the ones that we have to date.

Yes.

**Q:** Aside from coming here, to Charlotte, did you make any visits anywhere else in relation to this matter prior to writing your expert report?

**A:** I don't believe so.

**Q:** You didn't visit any other peanut processing facility?

**A:** No.

**Q:** Did you receive any other draft report or finalized report prior to the time you completed your expert report?

**A:** I guess I don't quite understand what you mean.

**Q:** Sure. Prior to the time you signed your expert report in this matter -- and that was on April 30th, 2013 -- had you received the expert report of any other expert in this case?

**A:** Dr. Lee Branscome.

**Q:** Okay. Any others?

**A:** No.

**Q:** You had not received even a draft of Lester Rich's expert report?

**A:** No.

**Q:** When is the first time you did receive Lester Rich's expert report?

**A:** It was sometime well after I issued my

report.

**Q:** Okay. When you reviewed Lester Rich's expert report, was there anything in there with which you disagreed?

**A:** I mean, I don't -- nothing comes to mind.

**Q:** Okay. You did not coordinate with Lester Rich in coming to your opinions in this case in any manner; is that correct?

**A:** When you say "coordinate," what do you mean by that?

**Q:** Well, I mean share information, sound out to one another what you're thinking of saying, and making sure that you're not saying things that are inconsistent from one another.

**A:** No.

**Q:** Didn't do that at all?

**A:** We did not do that, no.

**Q:** Did you have telephone conversations with him prior to the time each of you issued your expert reports?

**A:** I would have to look at my invoices, but I -- I don't think so.

**Q:** There was no information that he supplied to you that led you to write or not write something in your expert report?

**A:** Well, I mean, you know, we had a meeting. We

may have discussed things. But nothing that he said or provided me structured my opinions.

**Q:** Your last entry on Exhibit 248 is July 31st, 2013. Have you done work on this matter since then?

**A:** Yes.

**Q:** Okay. Approximately how many hours have you worked on this matter since July 31st, 2013, prior to today?

**A:** I think it's about 80 hours.

**Q:** 8-0?

**A:** 8-0.

**Q:** And that would be charged to the Quick, Widis firm at $230 an hour, correct?

**A:** Yes.

**Q:** Okay. And so it's about another 24-, $25,000? I'm sorry.

**A:** No.

**Q:** That's my bad math.

**A:** 18,400, I think.

**Q:** There you go. Thank you.

**A:** You're welcome. That's the new math.

**Q:** Thank you. Good.

Can you break that down into categories of what you've done over the course of those 80 hours?

**A:** You mean generally? Not number of hours but

what I've done in that 80 hours?

**Q:** Correct; since I don't have an invoice reflecting what you've done.

**A:** Right. I just wanted to make sure you weren't --

**Q:** Sure.

**A:** -- trying to give me -- ask for estimates of each category because I couldn't do that.

**Q:** I would like to know topically, category-wise, what you have done in those 80 hours.

**A:** Sure. I've reviewed other expert reports. I've reviewed other depositions, expert depositions, 30(b)(6) depositions. I have played with Fumitoxin flasks and watched and distributed Fumitoxin.

**Q:** I'm sorry. I didn't hear the words you used.

Played with Fumitoxin flasks --

**A:** -- flasks and distributed them and watched it -- watched them be distributed.

**Q:** That's something you did over Labor Day weekend, correct? Or the day -- the Monday after Labor Day?

**A:** Yeah. I hope it wasn't over Labor Day weekend, but --

**Q:** Tuesday after Labor Day.

**A:** Yeah. There you go.

**Q:** September 4th.

**A:** Yes. Well, I'm trying to think if it was -- if I traveled, I would have traveled on Tuesday and done it the four -- whatever the day after that was.

**Q:** Okay. What else have you done during those 80 hours?

**A:** I'm trying to -- I'm trying to think general categories. I mean, that's -- those are the main ones.

**Q:** Okay. Specifically, have you reviewed the deposition testimony of Lester Rich?

**A:** Yes.

**Q:** Have you reviewed the deposition testimony of Steve Brown?

**A:** Yes.

**Q:** Have you reviewed the deposition testimony of John Mueller?

**A:** Yes.

**Q:** Have you reviewed the expert deposition testimony of Dennis Ryman?

**A:** Yes.

**Q:** Have you reviewed the expert deposition testimony of Sean O'Keefe?

**A:** No.

**Q:** Okay. Have you reviewed all eight of the expert reports that were produced by the defendants in

this case?

**A:** I think I've skimmed some of them and reviewed others in great detail.

**Q:** Okay. Well, I'll just go through and make sure that you have actually seen each one of them.

Carol Jones?

**A:** Yes.

**Q:** Dale Mann.

**A:** Yes.

**Q:** Michael Montross?

**A:** Yes.

**Q:** Rodney Nohr?

**A:** That's one I've seen, yes.

**Q:** Sean O'Keefe?

**A:** I'm not sure if I have that or reviewed that or not.

**Q:** Dennis Ryman?

**A:** Yes.

**Q:** David South?

**A:** Remind me who David South is.

**Q:** From Monolithic Domes.

**A:** Is that the short report?

**Q:** Very short.

**A:** Yes, yes.

**Q:** John Walker?

**A:** Yes.

**Q:** Okay. So you're not sure if you've seen sean O'Keefe, and that was the only one you're not sure of?

**A:** That's right.

**Q:** Okay. All right. If you would, walk us through your investigation in this matter from August 3rd, 2012, until you issued your expert report on April 30th, 2013. What did you do? What were you considering? What hypotheses did you form? How did you investigate those hypotheses? And so forth.

MR. WIDIS: Objection.

THE WITNESS: Well, I obviously reviewed a bunch of material: depositions, complaints, et cetera. I looked at photographs and other information related to the dome and looked at various -- you know, the applicator manual for the Fumitoxin tablets and pellets, MSDS for that. Basically reviewed a lot of the material that was available to be reviewed.

BY MR. EPSTEIN:

**Q:** Okay.

**A:** And talked to John Cavaroc and talked to Lester Rich. And, as you know, I briefly spoke with Barry Lindley. Would have had a meeting as we talked about. I considered the various ignition scenarios and went through the process of evaluating those from the

standpoint of them being probable causes and essentially eliminated all of them. And looked at the application of Fumitoxin as being the cause and went through that process to show that that was the cause of the fire. Would have done some analysis by looking at temperatures, et cetera. Looked at scientific literature. I don't know if I mentioned reports or -- that would have been available to review.

**Q:** When you say "reports," can you be more specific? What do you mean?

**A:** Well, I'm trying to -- well, Dr. Branscome, for instance. That's, I think, the only one I reviewed.

**Q:** That was about lightening strikes, right?

**A:** Essentially, yeah.

**Q:** What else did you do to get to a point where you were ready to express the opinions that are contained in Exhibit 246?

**A:** Well, that's a lot. I then did some analysis related to self-heating.

**Q:** Did you, at some point during that process, come to understand that the defendants in this case would be contending that the fire was the result of self-heating?

**A:** Well, I mean, at some point it -- that's all -- it's something to be considered, and the way

you're asking questions, it was obvious that's what you guys were thinking.

**Q:** Okay. So in other words, you weren't in this case long before you knew the defendants would contend that the fire was caused by self-heating?

**A:** I think that's -- you know, that's appropriate -- that's correct.

**Q:** Okay. In the wheat case, is that what the contention by the defendant -- by the pesticide applicator was, was that the fire was caused by self-heating?

**A:** No.

**Q:** What was their contention in that case?

**A:** Sabotage or something like that.

**Q:** Okay. Did you consider sabotage in the Severn Peanut case?

**A:** Yes.

**Q:** How come you rejected it?

**A:** It just -- the dome was found sealed. No one would -- in their right mind would go into a dome filled with phosphine gas.

**Q:** Right. We're going to take a break in a minute, but before we take that break, let me ask: Based upon your review of documents in this case, do you believe the peanuts could have been safely removed from

the dome within the first two or three days following the discovery of the fire?

**A:** I have not evaluated that; so I can't answer that.

**Q:** As you were reviewing the information in this case, did it not strike you as odd that the peanuts had not been removed from the 11th of August of 2009, when the fire was discovered, until over two weeks later?

**A:** I don't know that it struck me as odd, but there were some circumstances I understand that were playing into that; for instance, the phosphine being in the dome, the EPA being involved, things like that. But again, I haven't evaluated that enough to give you an opinion on that.

**Q:** Okay. Well, let me ask you a question based upon what went through your mind. Did it go through your mind, at any point, "Why weren't these peanuts taken out of the dome?"

**A:** I mean, I didn't really consider that. That wasn't what I was looking at. Again, there's phosphine restrictions. There -- EPA is looking at it.

**Q:** Well, as someone who has been involved in fires and fire science for quite some time, you didn't come to any point in time in your review of materials -- put the materials down and ask yourself, "I don't

understand. Why didn't they get the peanuts out of the dome?"

MR. GOLDSTEIN: Objection.

BY MR. EPSTEIN:

**Q:** That never happened?

**A:** No, it actually didn't.

**Q:** Okay. Did you ever consider whether peanuts could have been removed, at least in significant quantities, just simply by offloading them from the spouts, the down -- the chutes that allow the peanuts to come out, the eight of them?

**A:** Did I consider if that could have happened?

**Q:** Did you ever question whether or not a large number of the peanuts could have been removed safely by that method?

**A:** I didn't question it. Again, I didn't consider it.

**Q:** Just wasn't part of your analysis at all?

**A:** No.

MR. EPSTEIN: Okay. All right. I think we're at a good stopping point.

THE VIDEOGRAPHER: Off the record at 11:24.

[RECESS TAKEN]

THE VIDEOGRAPHER: On the record at

11:34.
BY MR. EPSTEIN:
**Q:** Mr. Schumacher, please identify each and every test that you conducted prior to reaching your opinions that are contained in your April 30th, 2013, expert report, Exhibit 46 -- 246.
**A:** By tests, what do you mean?
**Q:** I mean a physical test, an experiment, something that involved materials.
**A:** Okay. I did not do any.
**Q:** None whatsoever, correct?
**A:** Right.
**Q:** You did, subsequent to issuing that report, perform some testing, correct?
**A:** More like demonstrations, yeah.
**Q:** Okay. Why?
**A:** Because I wanted to actually play with the Fumitoxin tablets and flasks and peanuts and see how they would be distributed in a situation that Lilley and Turner were under when they were trying to distribute these tablets inside the dome or into the dome.
**Q:** Is it your testimony that you believe you created a comparable set of conditions in which they applied Fumitoxin tablets?
**A:** I believe I created a condition that bolsters

my opinion that when you distribute these things, you get a very large concentration of tablets directly below where they're applying them and the manner that they applied them and the constraints that they were under to apply them, I believe, I did enough to support that opinion that there would have been concentrations directly below it.

**Q:** Would you agree with me that as of April 30th, 2013, you hadn't done enough to form a conclusion regarding that?

**A:** No, I would not agree with that.

**Q:** Why did you feel it necessary to do that on September 4th or September 5th, 2013?

**A:** Because I wanted to see it. That's what I thought would happen, and that was my opinion. And I wanted to see it and confirm that even more.

**Q:** Show you what's been marked as Exhibit 249.

[EXHIBIT NO. 249 MARKED FOR IDENTIFICATION]

THE WITNESS: Yes.

BY MR. EPSTEIN:

**Q:** Can you identify what that is?

**A:** It's a Second Supplemental Report dated September 6th, 2013.

**Q:** Why did you issue a Second Supplemental

Report on that day?

**A:** Because Mr. Widis asked me to.

**Q:** The Second Supplemental Report relates to your opportunity to take part in and witness the dispensing of Fumitoxin tablets from flasks onto the surface of peanuts in Memphis, Tennessee, on September 4th, 2013, correct?

**A:** Yes.

**Q:** And you did that in connection with your work on this case, correct?

**A:** Yes.

**Q:** You expect to get paid for the work you did in that testing, correct?

**A:** Yeah, of course.

**Q:** Okay. You didn't just do that on a lark; you did that because you were trying to bolster your opinions in this case, correct?

MR. GOLDSTEIN: Objection.

THE WITNESS: I guess I'm confused with your line of questioning. Are you asking me why I wrote a report, or are you asking me why I did -- you started off by asking me a different line of question.

BY MR. EPSTEIN:

**Q:** Sure. I'll withdraw the question and start another one.

You did this work in an effort to bolster your opinion as you had expressed it in your April 30th, 2013, expert report, correct?

**A:** I did this testing because I wanted to see the distribution, and it also bolstered my opinion.

**Q:** It wasn't just curiosity, because Mr. Widis wasn't going to pay you for your curiosity, correct?

MR. GOLDSTEIN: Objection.

THE WITNESS: I haven't asked him, but I would doubt he would.

BY MR. EPSTEIN:

**Q:** Mr. Widis knew you were going to be doing this testing, correct?

**A:** Mr. Widis knew?

**Q:** Let me back up.

Mr. Widis and his partners knew that you were going to be performing this testing before you performed it, correct?

**A:** Right; these demonstrations, correct.

**Q:** You needed to get authorization to do this work to know that you were going to be paid for it, right?

**A:** Yes.

**Q:** And you did get authorization to do it, correct?

**A:** Yes.

**Q:** Okay. Let me show you what's been marked as Exhibit 250.

[EXHIBIT NO. 250 MARKED FOR IDENTIFICATION]

BY MR. EPSTEIN:

**Q:** Can you identify what Exhibit 250 is?

**A:** These would be my notes from the demonstrations that we're talking about right now.

**Q:** All right. We're going to come back to these in a moment, but I want to hand you -- let me back up.

Was it you or someone who worked with you who was taking photographs of what was done that day?

**A:** I think a couple of us were.

**Q:** Okay. And over a hundred photographs were taken; is that your recollection?

**A:** Are you asking if I took over a hundred, or what's your question?

**Q:** I'm asking if there were over a hundred photographs that were taken that are part of your expert file to this -- to today?

MR. GOLDSTEIN: Objection.

THE WITNESS: I think that's correct. I mean, I'd have to go look.

BY MR. EPSTEIN:

**Q:** Okay.

**A:** I don't know for sure.

**Q:** You eventually got those photographs to this law firm to produce to me, correct?

**A:** Yeah. Let me -- let me take a look here to --

**Q:** Sure.

**A:** 103, it looks like.

**Q:** Okay. What I've done, so that we can talk intelligently without being overloaded with those photographs is I've selected some of those photographs to talk with you about today. Because the photographs don't print out with their number on it, as I hand you each one of these, I'm going to tell you which numbered photograph it was. You can certainly look through your notes, and if they don't seem to be right, you can let me know. But I wanted to be able to marry up your notes, which talk about photographs by number, with the exhibits that I'm about to hand you, all right?

**A:** Okay.

**Q:** I'm going to start by handing you Exhibit 251.

[EXHIBIT NO. 251 MARKED FOR IDENTIFICATION]

BY MR. EPSTEIN:

**Q:** And I will tell you and ask you to write somewhere in the white space on Exhibit 251 that that's the photograph that ends in 35.
**A:** Yeah. That's the best way to relate them.
**Q:** Okay.
**A:** That's the only number you really need.
**Q:** That's correct.
**A:** 035?
**Q:** 035.
**A:** Okay.
**Q:** Okay. And we're just going to make a pile of these.
So Exhibit 252, which I'm handing you, is 039.
[EXHIBIT NO. 252 MARKED FOR IDENTIFICATION]
THE WITNESS: Okay.
MR. EPSTEIN: Exhibit 253 is 040.
[EXHIBIT NO. 253 MARKED FOR IDENTIFICATION]
THE WITNESS: Okay.
MR. EPSTEIN: Exhibit 254 is 042.
[EXHIBIT NO. 254 MARKED FOR IDENTIFICATION]
THE WITNESS: Okay.

MR. EPSTEIN: Exhibit 255 is 052.

[EXHIBIT NO. 255 MARKED FOR IDENTIFICATION]

THE WITNESS: 052?

MR. EPSTEIN: Yes.

THE WITNESS: Okay.

MR. EPSTEIN: Exhibit 256 is 058.

[EXHIBIT NO. 256 MARKED FOR IDENTIFICATION]

MR. EPSTEIN: Exhibit 257 is 064.

[EXHIBIT NO. 257 MARKED FOR IDENTIFICATION]

MR. EPSTEIN: And Exhibit 258 is 091.

[EXHIBIT NO. 258 MARKED FOR IDENTIFICATION]

MR. EPSTEIN: And the last one is Exhibit 259, which is 101.

[EXHIBIT NO. 259 MARKED FOR IDENTIFICATION]

THE WITNESS: 259 is what?

BY MR. EPSTEIN:

**Q:** 101. Okay. You got the whole stack marked?

**A:** I do.

**Q:** All right. First of all, having looked through those photographs as we have been marking them,

would you agree with me that the peanuts that you used on September 4th in Memphis, Tennessee, were not farmers stock peanuts?

**A:** That's correct.

**Q:** They were actually processed peanuts, weren't they?

**A:** That's correct.

**Q:** They didn't have vines and leaves and foreign material in them, did they?

**A:** That's correct.

**Q:** They didn't have moisture that would be associated with farmers stock peanuts going into storage, did they?

**A:** No.

**Q:** These peanuts weren't part of a peanut mass in a pile of peanuts in a storage warehouse, were they?

**A:** No. They were a mass on the -- on the ground.

**Q:** But what I'm asking is, the source of the peanuts that came to you in Memphis, Tennessee, that day was not a storage warehouse containing a mass of peanuts in a storage environment, correct?

**A:** I guess I'm confused by your question a bit. Can you rephrase that?

**Q:** Sure. These processed peanuts came in bags

as if they were going to be sold to people to eat them, correct?

**A:** That question I understood. That's correct.

**Q:** These peanuts had not, for eight or nine months, been sitting in a storage warehouse before they wound up on some plastic in a yard in Memphis, Tennessee, on September 4th, 2013, correct?

**A:** That's correct.

**Q:** All right. These peanuts bore no similarity to the peanuts that Mr. Lilley and Mr. Turner confronted on August 4th, 2009, other than the fact that they were peanuts in their shells, correct?

MR. WIDIS: Objection.

THE WITNESS: I -- I disagree.

BY MR. EPSTEIN:

**Q:** Well, what do you disagree with?

**A:** They're peanuts. They have the same structure. They would pack similarly to peanuts in a dome. So they're peanuts, and they have a great similarity to these peanuts that were in the dome, other than they don't have the vines and the other stuff.

**Q:** How many millions of pounds of peanuts did you use for your testing on September 4th, 2013?

**A:** Well, I know you know we didn't use millions

of pounds.
**Q:** You didn't?
**A:** Did not.
**Q:** Okay.
**A:** I said, I know you know we did not use --
**Q:** Okay.
**A:** -- millions of pounds.
**Q:** How many pounds of peanuts did you use?
**A:** I'm not sure. It was probably three or four bags of peanuts.
**Q:** And how many pounds per bag?
**A:** I don't have the picture in front of me that shows the pounds per bag.
**Q:** Okay. You know the dimensions of the dome were 192 feet wide by 96 feet tall, correct?
**A:** I am aware of that.
**Q:** Looking at Exhibit 251, that's not the dimensions of what you were looking at that day, was it?
**A:** That's right.
**Q:** Okay. What were the dimensions of the pile that you created on September 4th, 2013?
**A:** It was -- the dimension was ten foot by ten foot.
**Q:** What was the height?

**A:** The height was probably three or four inches.

**Q:** What was the angle of repose?

**A:** We weren't trying to do the angle of repose in this instance. It's flat.

**Q:** Right. You had a flat pile of peanuts?

**A:** Right.

**Q:** To compare what Mr. Lilley and Mr. Turner did to peanuts that, in your report, you concluded had an angle of repose of somewhere between 30 and 38 degrees, correct?

**A:** That's right because that's -- we weren't looking at the angle of repose. We were looking at the flat spot and how the application of Fumitoxin tablets from a very small opening would generate significant piling. It has to, and it did.

**Q:** You said you were looking at the flat spot. Can you tell me what you mean by that?

**A:** Looking at a flat spot similar to the one that's being described by Lilley and Turner.

**Q:** Your testimony is, what is shown in Exhibit 251 is similar to what was described in the under-oath testimony of Brian Lilley and Randall Turner?

**A:** Yeah. I think they said it was about ten

feet.

**Q:** Okay. We'll talk about that.

So the -- in your mind, the comparison you were making was not to what would have happened to any other spot or point on the surface of the peanut pile on August 4th, 2009, with the very -- exception of the very top of the pile; is that correct?

**A:** In this particular demonstration, yes, we were looking at how the peanuts -- or, excuse me, the tablets land on a flat section of peanuts --

**Q:** Okay.

**A:** -- directly below the point of application.

**Q:** Okay. And that, in your mind, is the relevance of this demonstration to what happened on August 4th, 2009?

**A:** That's part of it.

**Q:** What's the other part?

**A:** Well, the constraints that Lilley and Turner were under when they were trying to apply the tablets: small opening, very constricted by the angle iron and other things in that area, the -- what happens when you actually turn a flask of tablets over, the restriction on their arm movement when they're trying to actually spread these out. It's going to all basically create a condition where you're going to have piling on the

surface below them and in other areas.

**Q:** Okay. You weren't looking into the issue of other areas other than the surface below them on September 4th, 2009, correct?

**A:** In this particular test, we -- that's right. We were just looking at this spot.

**Q:** The ten-by-ten spot that you say existed on August 4th, 2009, correct?

**A:** Well, the flat spot, yes. It's about ten foot.

**Q:** Okay. Go ahead and read, so we're clear on your handwriting, what you have written on the first page of Exhibit 250.

**A:** You want me to read everything on here?

**Q:** Yes, please.

**A:** Okay. So, "Number 1: Pile of tablets in bin during application one to two flasks.

"Number 2: Prepacks hung in building, removed, put in bucket, flash spent material, two to three days after hung.

"Number 3: ALP, aluminum phosphide, applied through roof of structure, fire. No rain. Piled.

"Number 4: Bulk tablet bags in buckets. Flash when you would open the buckets. Also evidence of fire in buckets that had gone out. Don't make that

product anymore.
"Number 5: Dry dust from aluminum phosphide on plastic on floor of structure. About two to three days after application. Gather up dust and plastic, ignites. Happens very frequently.
"Number 6: Opening flasks."
**Q:** And you have in your -- right next to "Advanced Engineering Systems," you have written "Examples of ignition without liquid. John Mueller," correct?
**A:** Yes, yes.
**Q:** So this was your review of his deposition, and that's what you got out of it?
**A:** That's not at all what that is.
**Q:** Okay. Tell me -- this is an interview with him where he gave you that information?
**A:** There's no interview. It was a discussion relating to his observations of this particular material, aluminum phosphide, and how it can flash without the presence of liquid water, and it happens frequently.
**Q:** Okay. You understand he is a paid expert witness in this case to work for the plaintiffs, like you?
**A:** Yes.
**Q:** Okay. Go to the second page. Tell me what

you have drawn and what you have written there.
**A:** Well, this is a schematic of a flask of Fumitoxin tablets.
**Q:** Okay. And underneath your description of the lot number, net weight, you have written something. Can you read what you wrote there.
**A:** "Opened a new flask. Heard noticeable 'hiss' sound. Draeger alarmed very quickly afterwards was about three feet from flask with Draeger."
**Q:** And what are you describing there?
**A:** Just the sound of opening a flask and what comes out.
**Q:** And what's the significance about the DrÃƒÂ¤ger alarmed?
**A:** It just -- it just means that you're putting phosphine out very quickly. And -- for instance, with Turner and Lilley being inside that head house, people opening that, they're going to be exposed to phosphine immediately and all the time throughout that application.
**Q:** Does it have a smell?
**A:** Yes.
**Q:** Pretty distinct smell?
**A:** Yes.
**Q:** Pretty dominant smell in terms of anything

else that might be around them?

**A:** Well, I don't know how to characterize that, but it's -- it's a noticeable smell.

**Q:** Well, if there were flowers ten feet away, which would have been more dominant, the smell of what was in that flask or the smell of flowers?

**A:** I don't know how to answer that. I'm assuming the smell of the flask material, but I don't know which flowers you're talking about and how potent those are.

**Q:** Okay. And if you were doing 49,000 tablets, do you think that would be a pretty powerful smell?

**A:** Yeah.

**Q:** Okay. You think on August 4th, 2009, in the head house, there was a pretty powerful smell of phosphine gas?

**A:** Yeah.

**Q:** Okay. Probably would have prevented them from smelling things that were in the dome beneath them, don't you think?

**A:** Not -- not initially, because they stuck their head in there initially.

**Q:** I'm asking when they were applying phosphine tablets.

**A:** I don't know about application, but

initially, no, it wouldn't have any bearing on that.

**Q:** All right. Go ahead to the next page in your notes. Tell us what you've written there.

**A:** "Set up simulated opening about 15 inches wide by 40 inches long on flatbed. Had cardboard attached to planks representing 7-inch concrete dome. Mueller on knees, arm through opening, holding bottom of flask, side to side, based on opening restriction. Arm about three feet from peanuts. Photos 27 through 41.

"Piled tablets, 160 to 170, by pouring them out of flask onto peanuts. Photos 42 through 48.

"Poured flask, 500 tablets into recessed area in peanuts. Dust came out with tablets. Photos 49 through 59.

"Mueller dispensed one flask of tablets from height of about 16 feet above 10-by-10 peanut pile. Moved arm similarly to first test. Photos 61 through 65."

**Q:** Okay. Before we move on to the next page -- so with the exception of Photograph 61 through 65, the other photographs were all taken when he was three feet above the surface of the peanuts; is that right?

**A:** No, that's not true. I mean, 61 through 65 are of that flask being dispensed. The other ones -- some were when he was on his knees dispensing. Others

were piles we had poured and -- onto the surface.

**Q:** All right. Let me ask it this way, then: Photographs 27 through 65 were made of the result of Mr. Mueller dispensing tablets from a flask when he was three feet above the surface of the peanut pile, correct?

MR. GOLDSTEIN: Objection.

THE WITNESS: No.

BY MR. EPSTEIN:

**Q:** Then tell me what I'm missing.

**A:** 61 through 65 were of --

**Q:** I'm sorry. I'm sorry. I hate to interrupt. You're right. Let me fix my question.

Photographs 27 through 59 are photographs depicting the result or showing the process of Mr. Mueller dispensing tablets from three feet above the surface of the pile, correct?

**A:** I mean, 27 through 41 was what's depicted in one of those pictures, him dispensing them from the flatbed. The other ones we poured out just standing a couple feet above the peanuts --

**Q:** Right.

**A:** -- so that it wasn't related to that flatbed distribution. But the answer -- general answer is yes.

**Q:** There was no effort made in any of those

photographs to replicate the circumstances that Mr. Lilley -- Mr. Lilley and Mr. Turner faced on August 4th, 2009, regarding their distance from the peanut pile, correct?

**A:** Regarding their distance, correct. But again, the constraints and the -- how the peanut -- how the tablets come out of the flask would definitely represent what they were doing.

**Q:** Mr. Schumacher, are you testifying that from three feet above the surface of the pile, when one shakes a flask of these tablets, the distribution of those tablets is going to be no different than had one been 20 to 25 feet above the surface of the pile? Is that your testimony?

**A:** That's not what I said.

**Q:** Okay. Well, explain to me how there's any relevance at all to watching Mr. Mueller, from three feet above the surface of a flat spot, distribute tablets when you know in this case Mr. Turner and Mr. Lilley were 20 to 25 feet above the surface. What's the relevance?

**A:** Because what I'm saying is, if you look at when the flask is initially turned over and the tablets fall straight down right below where you are, that is indicative of how they're going to come out, and that is going to create a piling situation directly below them.

And his movement of his arm shows you how restricted the person who's trying to distribute those tablets is under.

**Q:** Mr. Schumacher, is it your testimony that if Mr. Turner and Mr. Lilley were 20 to 25 feet above the surface of the peanuts, making the exact same arm movements that Mr. Mueller made with a flask, that the distribution of the tablets on a flat spot below them would have resembled the distribution of the flat -- of the tablets on the flat spot that Mr. Mueller obtained? Is that your testimony?

**A:** That's not what I said again.

**Q:** Okay. Then help me understand the relevance.

**A:** We're missing each other.

**Q:** Sure we are.

**A:** It's a pretty simple concept, and it is this: When you take a flask and you turn it over, initially you're going to have a large amount of tablets come straight out of that flask before you even start moving it. That representation of how those tablets come out of the flask initially is representative of what's going to happen when they're trying to do that. That's what I'm saying. I'm not saying how the tablets land on the peanuts three feet away is going to show the distribution below them, but I'm telling you that it's going to show

you exactly what's going to happen when you take a flask and turn it under -- upside down to distribute it. And that doesn't take into consideration if you get bridging when you have a flask so that you have to unbridge that flask. And when you do that, two ways you can do it. You shake it up like this, and so that unbridges and it comes out directly straight down below you; or you take it up, turn it over. Same concept, dump it back in straight below you.

**Q:** Okay. Can you, for the camera --

MR. EPSTEIN: And, Videographer, I'd like you to capture this, please.

**Q:** Can you demonstrate how you believe Mr. Lilley and Mr. Turner applied the Fumitoxin tablets on August 4th, 2009, when they were on their hands and knees at the hatch?

**A:** Well, I mean, they described it differently. They said they were on their hands and knees and they were squatting. There were two different situations. And so when you're squatting, you can't really get your arm down there all the way to get it past the pivot point. And so you're doing this, and you're holding the flask and you're going side to side. And you're locked by your elbow. It can only go this way, but it can't go back this way. And so you're going to have a natural

fanning distribution in one direction, and you're going to naturally come back over that same spot below you a couple times for every time you go to one side. And so that's one way.

Now, if you're on your knees, you have a better chance to get it in there, but you've got to remember what their constraints are. They have angle iron that is limiting their ability to get their arms into the opening. They have electrical boxes there. And so they're basically going side to side along the 15-inch opening, as they described it.

**Q:** With a flask in the hand and the tablets coming out of the flask?

**A:** Yes.

**Q:** That's your understanding of their testimony?

**A:** Yes.

**Q:** Okay. So we're clear on that. And that's what Mr. Mueller did; Mr. Mueller didn't do anything different than that during September 4th, 2013?

**A:** Than taking a flask, holding it, and then distributing it like that?

**Q:** Correct.

**A:** That's correct.

**Q:** Based upon your belief that that's how

Mr. Lilley and Mr. Turner applied the Fumitoxin tablets, correct?

**A:** Yes.

**Q:** Okay. You didn't know that Mr. Turner applied Fumitoxin tablets with a bare hand?

**A:** That was not described in his deposition.

**Q:** Really?

**A:** Well, that I remember.

**Q:** Okay. If you had remembered that, you might have needed to alter the testing you did, wouldn't you have?

**A:** Slightly, yes.

**Q:** You didn't do any testing where Mr. Mueller took tablets with his bare hands and threw them below him, did you?

MR. GOLDSTEIN: You mean Mr. Turner.

MR. EPSTEIN: No. I mean Mr. Mueller.

THE WITNESS: That's right.

BY MR. EPSTEIN:

**Q:** You did not pick up on the fact, in Mr. Turner's deposition, that he testified that some of the Fumitoxin tablets he applied with his open hand and not with the flask itself?

**A:** Now, you just said some of them, and so --

**Q:** Right.

**A:** I can go back and read that, but -- that's fine, but there was distribution from the flask. Maybe some of them are from the hand, but that doesn't change the fact that by distributing it through a flask you're going to still have that situation.

**Q:** Correct me if I'm wrong. Until I just pointed it out to you, you did not recall that Mr. Turner had distributed Fumitoxin tablets with a hand as opposed to with a flask?

**A:** I did not recall that.

**Q:** Okay. Let's look through the -- well, let me back up. Go quickly to the third page and tell me what you have written there. I'm sorry; the fourth page.

**A:** The fourth page?

**Q:** Yes.

**A:** All right. Are you saying that you can't read my handwriting?

**Q:** I'm saying I want to make sure we all can read your handwriting.

**A:** Fair enough.

"Made piles of peanuts about one to one and a half feet tall. Dropped tablets onto pile from about two feet above. Some tablets stuck in pile. Some rolled down. Some bounced off. Same with height of about ten feet.

"Dropped Weevil-Cide tablet into spent Weevil-Cide dust. Tablets sunk into dust and disappeared."

And then do you want me to go through the photo log?

**Q:** Yes.

**A:** "Photo 60. Fumitoxin in peanuts in shade.

"66 through 73. Tablet prepack.

"74 through 88. ProFume closed-loop fan. Eco2Fume vapor. Phosphine fumigant. Phosphine generator.

"89 through 101. Weevil-Cide flask, spent Weevil-Cide" -- "spent Weevil-Cide with new tablet next to it.

"102. Dropped Weevil-Cide tablet into spent Weevil-Cide dust from about one to two feet."

103 is uncovered tablet.

**Q:** Okay. Now, going to the top of that page, it seems to me that you made small piles of peanuts in an effort to determine what would happen when you dropped Fumitoxin tablets onto those piles, correct?

**A:** Right; from various heights.

**Q:** And what happened is the tablets dispersed, correct?

**A:** Well, some stuck in there. Some rolled a

little bit. And some bounced off. Correct.

**Q:** You didn't get piles of Fumitoxin tablets on a pile of peanuts, did you?

**A:** I mean, that's not what we were attempting to do. We were attempting to see what happens with the tablets, and they stick in there was well as roll and bounce.

**Q:** Okay. Ask the question again. You didn't get piles of tablets when you had piles of peanuts and you were applying the tablets from above the piles of peanuts?

**A:** That's right; because we weren't trying to do that. We weren't throwing 98 flasks full of 500 tablets into the same area.

**Q:** And you didn't take any photographs showing the results of what happened when you applied the tablets to a pile of peanuts, correct?

**A:** Well, that's not correct.

**Q:** Well, are there photographs listed with that first paragraph that I've missed?

**A:** Well, that's one type of pile. A flat is also a pile. You've got to describe your pile.

**Q:** I'm talking about the -- the piles that you made on the top -- referenced on the top of the fourth page of Exhibit 250 were piles that had an angle of

repose, correct?
**A:** That's right.
**Q:** And when you had an angle of repose, one, you didn't take pictures of that, did you?
**A:** I did not, but Lester Rich did.
**Q:** Lester Rich was there on September 4th?
**A:** Oh, we didn't talk about who was there? You never asked me that question.
**Q:** Okay.
**A:** Yes, he was there.
**Q:** Okay. Who else was there?
**A:** John Mueller.
**Q:** All right. So three of the four experts for the plaintiffs in this case, over four months after the expert report deadline, were out doing testing on what happens when you drop Fumitoxin tablets from above a pile of peanuts; am I accurate?
**A:** Three of the four experts were doing demonstrations, yes, of this phenomenon. Exactly.
**Q:** Four-plus months after you were required to issue your expert reports in this case, correct?
**A:** Right.
**Q:** Okay. Any reason why that didn't happen prior to the time you were required to issue your expert report in this case?

**A:** No reason.

**Q:** Any reason that you felt it was a good idea to do it after you issued your expert report in this case?

**A:** I just wanted to see the peanuts and how the tablets landed on them, how the tablets came out of the flasks, and it was consistent with what I thought was going to happen.

**Q:** Would you agree that to form a valid scientific conclusion as to what will happen, you've got to do more than think about it; you actually have to find something that supports what you think?

**A:** Well, you can do testing, thought experiments, which is perfectly allowable in 921. And those experiments that I did showed exactly what these demonstrations that I did showed.

**Q:** You weren't comfortable relying on your thought experiments, obviously, were you?

MR. GOLDSTEIN: Objection.

THE WITNESS: It has nothing to do with being comfortable or not comfortable. I just wanted to do it.

BY MR. EPSTEIN:

**Q:** Okay. Who was directing what Mr. Mueller was doing? You? Mr. Rich?

**A:** I think it was consensus-based, and we decided what we thought we wanted to do and we did it.

**Q:** Did you draw up a protocol of any sort?

**A:** No.

**Q:** Was there any attorney there with you?

**A:** No.

**Q:** Did you have phone conferences with Mr. Mueller and Mr. Rich in advance of going out to Memphis, Tennessee, to do this testing?

**A:** Mr. Mueller, no. Mr. Rich, yes.

**Q:** What did you discuss with him?

**A:** Timing, when we'd be there.

**Q:** Did you discuss with him the protocol that you would be using?

**A:** Well, we discussed what generally we wanted to do.

**Q:** Okay. And what did you discuss you generally wanted to do?

**A:** Basically what you see here.

**Q:** Decide if peanuts would -- I'm sorry. Decide if tablets would form piles on the flat surface of peanuts?

**A:** It wasn't decide. We wanted to demonstrate, like I said, the tablets coming out of the flask onto the flat surface and how they would react on angled

surfaces.

**Q:** And on angled surfaces, the tablets dispersed from being applied only two feet above them, correct?

**A:** They -- well, again, we only put a few on there. And so I can't tell you that they dispersed and you wouldn't get piling, because some of them stuck and some of them rolled a little bit and some of them bounced.

**Q:** You don't have any pictures to show me any that stuck together, do you?

**A:** Well, I don't have any pictures of that because, as I said, Lester Rich took those photographs.

**Q:** Okay. Are you going to rely on those photographs in testifying as an expert in this case?

**A:** Well, I haven't really looked at them. So I don't know what they show. I'd have to look at them. But I've seen them stick with just a few app- -- tablets where they stick on the actual sloped surface of the peanuts. And that's not considering any recessed areas or areas where -- that would be natural collection points.

**Q:** Okay. I'm going to walk with you through the photographs and make sure I understand what we're looking at. Photograph 35, which is Exhibit 251. Describe what we're looking at there.

**A:** That would be the flatbed with the peanuts below them and the ladder and the tarp.
**Q:** Okay. What was the maximum height one could obtain by applying peanuts from that -- I'm sorry -- applying tablets from that ladder?
**A:** I get that mixed up, too, sometimes. But it's -- I think it's 17 feet.
**Q:** Okay. That was the highest you could get?
**A:** Safely, yes.
**Q:** Above the surface of the peanut pile or above the ground?
**A:** Surface of the peanut pile.
**Q:** Okay. And the flatbed was how high above the surface of the peanuts?
**A:** I think the flatbed was about four feet above it.
**Q:** Okay. And if you look at the next picture, Exhibit 252, Photograph 39, Mr. Mueller was actually applying the Fumitoxin flasks below the surface of the flatbed, correct?
**A:** Yes.
**Q:** So three feet, two feet above the surface?
**A:** I thought it was about three feet; so I'm not totally sure about the height of the -- the flatbed.
**Q:** Were these dummy tablets?

**A:** No.
**Q:** These were actual tablets?
**A:** Yes.
**Q:** There was actual phosphine being released in the environment?
**A:** Yes.
**Q:** Okay. Did you have a permit of any kind to do this -- to do this test?
**A:** I didn't set it up. I don't know.
**Q:** Okay. Any particular reason Mr. Mueller was not wearing a gas mask?
**A:** You'd have to ask him. I don't know.
**Q:** Were you wearing a gas mask?
**A:** No; but we had alarms.
**Q:** Okay. And the alarms went off, correct?
**A:** At times. Other times, they wouldn't.
**Q:** Didn't make you uncomfortable that there was phosphine being released in sufficient concentration to set off those alarms, and you weren't -- you had no breathing apparatus?
**A:** No; because we got away right away when they alarmed.
**Q:** Okay. What is depicted by the cardboard cutouts in Exhibit 252?
**A:** That was a depiction of the thickness of the

dome.

**Q:** Okay. And I'm specifically trying to get you to tell me what is depicted by the dimension between those two pieces of cardboard.

**A:** 15 inches.

**Q:** Okay. And that's because that was the width of the hatch through which Mr. Turner and Mr. Lilley applied the Fumitoxin tablets?

**A:** That's correct.

**Q:** So what we're looking at with Mr. Mueller on his hands and knees would approximate what either Mr. Turner or Mr. Lilley was doing on August 4th, 2009, at either end of that rectangle; is that your understanding?

**A:** Well, no -- yes and no. I mean, they're not being -- he's not being constrained by the angle iron and the electrical box that would be there that would naturally impede their ability to really get their arm in there well.

**Q:** What else is different about what we see in Exhibit 252 than the deposition testimony of Mr. Turner and Mr. Lilley regarding how they applied the Fumitoxin tablets?

**A:** Well, I mean, they're -- he's applying it with the flasks turned upside down like they said they

did. He's not using his hands, if that's what you're talking about.

**Q:** Is that a side-to-side motion that's being pictured in Exhibit 252, or is that just turning the flask upside down and dumping it?

**A:** No. That was a picture caught in the middle of moving it back and forth. So it's a still photograph, not a video.

**Q:** Okay. And it's your testimony he didn't just dump it; he just -- you don't have a video, do you?

**A:** Lester has a video.

**Q:** Lester has a video?

**A:** Yeah.

MR. EPSTEIN: Let me go off the record, please.

THE VIDEOGRAPHER: Off the record at 12:11.

[RECESS TAKEN]

MR. WIDIS: For the record, the parties have agreed that the questioning regarding the trip to Memphis will stop now, and with the understanding that Mr. Schumacher will be subject to deposition later at a later date. We're going to reserve our positions as to the time that that deposition can take. But at this point, we're going to resume the deposition and just move

on from the subject of the Memphis visit.

MR. EPSTEIN: And I'll just state that that's consistent with my understanding with the caveat that I am not precluding the possibility that my client may move in the interim to strike or exclude any evidence in this case of this testing. And if, of course, that were to happen, then we would not proceed ahead with the subsequent deposition. And in the interim, we're also looking for the production of all materials, written, photographs, videos, and so forth, associated with the work that was done in Memphis on September 4th, 2013.

MR. GOLDSTEIN: And we agree that will be produced within the next few days.

MR. EPSTEIN: Okay. So I guess we're ready to go back on the video record.

THE VIDEOGRAPHER: Stand by.

We're on the record at 12:40.

BY MR. EPSTEIN:

**Q:** Mr. Schumacher, what I'd like you to do now is walk me through every step in the sequence that led in your opinion -- that led to your opinion -- strike that. We'll start again.

I want you to walk me through every step in the ignition scenario, as you have opined or intend to opine at the trial of this case, from the application of

Fumitoxin on August 4th, 2009, to the discovery of smoke coming out of the head house on August 11th, 2009. Do you think you can do that?

**A:** I can try, sure. Basically, you had Turner and Lilley in the head house with 98 flasks, each containing 500 tablets. And they were applying the flasks through a 15-inch by about 40-inch-wide opening. And they were on the 15-inch side, both of them, and they were constrained by the angle iron and other things. And in applying that -- or applying the tablets, they formed one or more piles of tablets on the surface of the peanuts, and the piling created a concentration of phosphine gas proximate to the pile or piles that was at or above the LFL and ignition occurred.

The fire was initially likely a smoldering fire that may have transitioned into flame at some point, but most of the time within the dome, it was smoldering. And because the dome is very well sealed, smoke was not able to get out until -- well, they initially started smelling things on August 10th. Smoke was actually observed on August 11th.

**Q:** Okay. I want to focus now, specifically, on the pile or piles. And you testified in the alternative. I take it you haven't formed a conclusion about that, correct?

**A:** About what?

**Q:** If there was one pile of Fumitoxin tablets on the surface of the peanuts or more than one.

**A:** Well, I think there's at least one. I would not be surprised if there were several.

**Q:** Okay. What I want to do is take at least the one that's part of your opinion and have you describe, in the depth that you are capable of, exactly what was happening in that pile from the moment it formed until the moment there was combustion.

**A:** Well, basically, you have the pile of tablets and the reaction takes place with the moisture in the air as well as the commodity. And that instantly starts to -- or rapidly starts to generate phosphine. When I say rapidly, initially starts off generating phosphine. And it generates it far quicker and faster than if you had a single tablet because they're in a pile situation, and that pile situation now creates a concentration that's at or above the LFL. And you're going to get the reaction occurring, which creates heat. And that heat drives the temperature; the temperature drives the reaction; and you get this process where you can get heating of the pile. And at some point, the -- the phosphine ignites, and from there, it ignites other combustible material within the pile of peanuts.

**Q:** When you say "other combustible material within the pile of peanuts," what specifically do you mean by that?

**A:** Well, the -- the dust, the -- the foreign material, the twigs, things like that. The hulls of the peanuts, the peanuts themselves.

**Q:** Do you have an opinion as to what specifically was ignited?

**A:** Well, I think all of that was eventually ignited.

**Q:** Do you have an opinion as to what was first ignited?

**A:** Well, I think it was the smaller material that's in there.

**Q:** And not the peanut hulls?

**A:** Well, and the peanut hulls, things like that. Not necessarily entire peanut itself, but maybe broken peanuts, hulls, foreign material, things like that.

**Q:** How many tablets were in these piles or the pile that you have opined was created?

**A:** I don't know the exact size of the piles, but the manner in which they applied the tablets, they would lead to significant piling.

**Q:** Define what you mean by "significant piling."

**A:** Well, again, I don't know the size, but they

could be, you know, a hundred to 200 tablets possibly, maybe more.

**Q:** Okay. Would you agree with me that if you had a pile of a hundred to 200 tablets, that a number of those tablets will not be exposed to the ambient air, initially?

**A:** Some may not, yes, initially. Depends on the pile, the distribution of them in the pile, how they are contacted by the peanuts --

**Q:** Go back --

**A:** -- things like that.

**Q:** Let's go back and have you look at -- not for purposes of talking about your Memphis trip, which we'll do another day -- have you look at Exhibit 254.

**A:** Okay.

**Q:** If you had to approximate, how many Fumitoxin tablets do you believe are in that pile?

**A:** 160.

**Q:** Okay. So it's right between a hundred and 200, just by happenstance, right?

**A:** I mean, again, I don't know the exact number that would be in there, but I'm just giving you an example of the sizes that you -- that you would expect.

**Q:** Right. Okay. So you've got 160 there. How many of those tablets are exposed to the ambient air?

**A:** Well, there -- there's some porosity in there; so they're all exposed to a certain extent.

**Q:** Okay. Is it your testimony that the tablets on the exterior do or do not insulate the tablets on the interior of that pile from the ambient air?

**A:** Well, to a certain extent, but there's porosity, and you can't completely insulate them from all of the air.

**Q:** Is it your testimony that there will be a reaction, a chemical reaction, releasing phosphine from all 160 of those tablets as soon as they hit that -- as soon as they form that pile?

**A:** That's not what I said.

**Q:** Okay. I'm asking.

**A:** Right.

**Q:** Is it your testimony that all of them will be part of that reaction initially?

**A:** A significant number will be, not necessarily all of them.

**Q:** Okay. How do you know a significant number will be?

**A:** Just because you're going to have air around these tablets, and you're going to have a significant amount of them on the outside that are exposed. And some on -- a lot of them on the inside, not necessarily

in the core of them, will be exposed to moisture, which will then generate this reaction.

**Q:** And then what happens to the phosphine when the reaction starts?

**A:** The phosphine, some of it basically moves, and it's trapped a bit because it's now in a pile versus if you had one single tablet on top of a peanut pile where it can disperse wherever it wants to go without any inhibition.

**Q:** I thought you said there was porosity. So where -- where's the trap?

**A:** Well, there is porosity, of course, but it's a lot more confined than if you had a single tablet with nothing on top of it.

**Q:** Why?

**A:** It should be obvious.

**Q:** Tell me why.

**A:** You have one tablet sitting on top of a peanut pile, the phosphine can go straight up without having anything confining it, versus if you have a pile of tablets, you're going to confine whatever is in the center from moving out to a certain extent.

**Q:** Suppose what's in the center hasn't even reacted yet?

**A:** In the immediate center, right, but you're

going to have to some -- and that's -- that's pile configuration based -- it's based on pile configuration. And so some of it you have a majority of them reacting; some of it you may have not as many in the middle reacting.

**Q:** Well, what's going to react mostly is what's on the outside, correct?

**A:** Right. But you can't say that just because one pile has a lot of them on the outside reacting that another pile won't have the majority of them reacting. There's going to be a delay in reaction, certainly, but eventually all of them will be reacting.

**Q:** Well, what happens to the tablets on the outside that are reacting after they have reacted? What happens to those tablets?

**A:** I guess I don't quite understand your question.

**Q:** Well, what -- what is the finished product of the tablet after the reaction is complete?

**A:** You have aluminum hydroxide, and you -- and often you have spent -- a material that hasn't reacted, necessarily. You can have some dust that has aluminum phosphide that's unreacted.

**Q:** Okay. And will that dust act as a door allowing more ambient air to get to the interior of the

pile?

**A:** React as a -- act as a door?

**Q:** Act as a means through which more ambient air can reach the interior of the pile to cause more of a reaction on the interior of the pile.

**A:** It may act as an inhibitor, but you eventually will get air into the center of the pile.

**Q:** Well, how do you get air into the center of the pile at the same time you confine the gas in the center of the pile? How does that happen?

**A:** You've got a couple things going on. You've got the reaction taking place where you're generating the phosphine, and you also have -- you don't just have the stagnant environment. You're going to have air moving in. You're going to have phosphine moving out. But they're not going to move as fast as if they weren't in a pile. So if you had a single tablet, that's different. When you have a pile, you change things dramatically.

**Q:** But you still have diffusion of the phosphine gas away from the pile, correct?

**A:** Sure. I didn't say you wouldn't have that, but you basically now are generating at such a rate that you're creating a concentration that's at the LFL that you wouldn't normally have if you had a single tablet.

**Q:** What testing have you done that allows you to

state that opinion to a degree of scientific probability?

**A:** Well, I've done, again, thought experiments. And that's -- that's what this would tell me. I've seen a bunch of literature that suggests the same thing is happening. I've seen testing done by -- by Dale Mann that shows exactly what I'm talking about. You have high concentrations in piles being generated. In fact, a couple of his tests he almost reached the LFL with a hundred tablets in that particular configuration. So I have seen testing that basically demonstrates that.

**Q:** Correct me if I'm wrong. 100 percent of the testing that you have seen reported resulted in the LFL not being reached, correct?

**A:** If you're talking about the testing where they use 1, 4, 5, 20 and a hundred tablets, that's correct. The hundred-tablet test almost reached the LFL.

**Q:** If it almost reached the LFL, that's about the same as being almost pregnant, right?

**A:** Right. But it's like, why stop at a hundred tablets? Why was that the threshold for testing? They could have added 20 percent, and logically that would have brought you to the LFL. There will be a pile size that will create the LFL.

**Q:** How do you know that?

**A:** Because I know it based on Dale Mann's testing, based on the science of this, based on the fact that people who are applying this stuff see this stuff ignite in piles. You've got people opening flask and it flashes, and you've got people opening pails and it flashes. So you know it's going to happen. You confine it enough, you generate it fast enough, you're going to hit the LFL.

**Q:** Are there forensic testing laboratories in the Denver, Colorado, area?

**A:** I don't know what you mean by that.

**Q:** Are there forensic chemists who are capable of making a pile bigger than 100 tablets so that you can demonstrate how the LFL is reached in a pile of Fumitoxin tablets?

**A:** Oh, I'm sure. But in this particular case, I don't need to do that to know that that's going to happen.

**Q:** So you needed to go out to Memphis, Tennessee, on September 4th, 2013, to demonstrate what will happen when you apply Fumitoxin tablets to a pile of peanuts, but you didn't need to actually do work necessary to demonstrate your primary opinion in this case, which is what will happen to those piles in terms

of the concentration of phosphine gas?

MR. GOLDSTEIN: Objection.

THE WITNESS: I didn't have to go out and do the demonstrations in Memphis, and I don't have to do a test here to tell you that the LFL will be reached and ignition will occur. The science shows it. Field experience shows it. The literature shows it. All the -- the manual shows it's going to happen. They warn against it. So I don't have to do that to know that it's going to happen.

BY MR. EPSTEIN:

**Q:** Okay. I'm showing you what we're marking as Exhibit 260.

**A:** Yes.

[EXHIBIT NO. 260 MARKED FOR IDENTIFICATION]

BY MR. EPSTEIN:

**Q:** And 260, I'll tell you, the out -- the first page is the cover of NFPA 921 2008 edition, and I want to focus you on Section 20.5, Fire Testing. I'm sorry. I gave you -- I'm going to -- that's my cheat sheet.

**A:** Makes it easier for me.

**Q:** I'm sure it does. You're going to be looking at the same exact spot, but I need to know what spot to look at. Try this again. Showing you Exhibit 260, and

I'm focusing you on Section 20.5, Fire Testing.
Would you agree that fire testing is a tool that can provide data -- that can provide data that competent data collected at the fire -- sorry. We'll try again.
**A:** Let's read that again.
**Q:** I've got to use the right word.
Would you agree that fire testing is a tool that can provide data that complement data collected at the fire scene or can be used to test hypotheses? Would you agree with that?
**A:** Sure, you can do that.
**Q:** And here, they're not talking about thought testing in NFPA 921, are they?
**A:** They're talking about physical testing, but it's not necessary in this case.
**Q:** Not my question. Would you agree that such fire testing can range in scope from bench-scale testing to full-scale recreations of the entire event? Would you agree with that?
**A:** That such testing could -- that -- yeah, sure. Depends on what variables you take into consideration --
**Q:** Sure.
**A:** -- how those bench-scale testing relate to

the actual full-scale testing, if they can be scaled up. If you've actually done enough testing to show that the bench scale are supportive of a full scale, I would agree.

**Q:** Okay. And would you agree with 20.5.1.1, that "Used as part of a data collection, fire testing can provide insights into the characteristics of fuels or items consumed in the fire into the characteristics of materials or assemblies affected by the fire or into fire processes that may have played a role in the fire. This information is valuable in the analysis of data and the formation of hypotheses"?

Do you agree with that?

**A:** I agree that it can be valuable, and sometimes it may be necessary. But it's not always necessary, and you don't always have to do it on every single fire.

**Q:** Would you agree with Section 20.5.1.2, that "Used as a part of hypotheses testing, fire testing can assist in evaluating whether a hypotheses is consistent with the case facts and the laws of fire science"?

Would you agree with that?

**A:** Sure. It can assist, if you need it. If you don't need it, then you don't need to do it.

**Q:** Fire testing can also assist in evaluating

whether a hypothesis is inconsistent with the case facts and the laws of fire science, correct?

**A:** Did you read -- is that --

**Q:** That's the -- the converse of what is written in the first sentence.

**A:** So you haven't read that from 20.5.1.2.

**Q:** I just changed the word "consistent" to "inconsistent."

**A:** Say that one more time.

**Q:** Would you agree that, used as part of hypothesis testing, fire testing can assist in evaluating whether a hypothesis is inconsistent with the case facts and the laws of fire science? Do you agree with that?

**A:** Sure. If -- if you need to do that, you need to test it, it can help under certain circumstances.

**Q:** Well, I want to make sure --

**A:** It's not necessary on every case.

**Q:** I want to make sure we're clear on one thing. You could have done testing that would establish or falsify the hypothesis that you reached in this case.

Would you agree with that?

**A:** Well, I could have done testing, if that's what you're saying. But again, in this case, it's not necessary because everything shows it's going to happen. It's going to happen, and literature shows it. Science

shows it. The distributor shows -- they warn against it.

**Q:** Okay. That's not my question. My question very simply is, you could have conducted testing with the aid of a forensic laboratory that would either establish or falsify your hypothesis in this case that a pile of Fumitoxin tablets created a scenario which led to ignition? Agree or disagree?

**A:** I could have done testing to try to demonstrate that, but just because you do testing and you don't get an outcome doesn't mean it's not going to happen. For instance, there are things you can't control. You may not recreate exactly what happened. You may not have the exact pile size, pile dimension, moisture content, relative humidity. All these things come into play. And so can you do testing? Sure. But it's not necessary in this case because I've gone through the process of evaluating the different causes, and I've eliminated everything, and I've looked at the other potential cause, and I've gone through that process, and it's the only cause of this fire.

**Q:** Mr. Schumacher, I understand that you want to demonstrate to anybody who will listen to you that it wasn't necessary in this case, and that has nothing whatsoever to do with my question.

MR. GOLDSTEIN: Objection to the statement.

BY MR. EPSTEIN:

**Q:** My question to you is, could you, with the assistance of a forensic laboratory, have done testing that would demonstrate that your hypothesis in this case is true and not false?

MR. GOLDSTEIN: Objection.

THE WITNESS: Could I have done testing? Possibly.

BY MR. EPSTEIN:

**Q:** That would demonstrate --

**A:** Possibly.

**Q:** Possibly?

**A:** It depends on the parameters that you're looking at and if you recreated that -- those parameters that were in the dome at the time of this fire. So, yes, I could have done that.

**Q:** Okay. I -- put the dome aside. Put what you want to say about this not being necessary aside.

My question to you is, could you have done testing, with the assistance of a forensic laboratory, that would demonstrate under any conditions you decided for a dry pile of aluminum phosphide tablets that you can place that pile in some environment, however adverse you

want to make it, and without the introduction of liquid water, one, reach the lower flammable limit of phosphine gas and, two, auto-ignite the phosphine gas? Could you have done that?

**A:** Yes, it's possible to do that.

**Q:** And you consciously chose in this case not to do that, correct?

**A:** Right; because I didn't see the need to it. There's no value. I know it's going to happen.

**Q:** And because you know it's going to happen, you don't need to prove it's going to happen?

**A:** That's right. Science -- well, no. I have proved it's going to happen through the fact that science shows it's going to happen, that all the information that the distributor provides shows it can happen, it will happen. You have Ryman, who is the 30(b)(6) person, saying it can happen. You have the IFC 30(b)(6) people saying it can happen. You've got a bunch of case studies showing it does happen. You have people who have field experience who actually witness it happening. So I don't need to do the testing to know it's going to happen.

**Q:** You just know?

**A:** Yeah.

**Q:** You just know?

**A:** Right. And that's -- you're taking one small

part of it. It's the whole investigation that I've done, and I know that that's going to happen.

**Q:** So fire science is, when you just know, you just know; that's the way it works, right?

MR. GOLDSTEIN: Objection.

THE WITNESS: Well, that's not -- that's not what I'm saying.

BY MR. EPSTEIN:

**Q:** That's not?

**A:** I told you -- I've told you all the reasons why I know it's going to happen and that through the process of going through the causation analysis that that's the only cause.

**Q:** Okay. So without anyone ever having demonstrated in the history of the world that a dry pile of aluminum phosphide tablets in a controlled environment will cause phosphine gas to reach its lower flammable limit and will cause autoignition of the phosphine gas, it is a matter of science that that will happen?

**A:** Yeah. People see it in the field happening. People see it when they open up flasks. People see it when they open up pails. People see it when they actually take the spent material and collect it and it ignites on them. There's no water. It's all moisture in the air. And so it's igniting in a pile because it

reaches the LFL.

**Q:** When did that happen in this case?

**A:** When did what happen?

**Q:** The process that you just described.

**A:** Well, I don't know the exact timing on that.

**Q:** Approximate it for me.

**A:** Well, I think if you look at the literature, two-to-three-day periods is about as close as I can get.

**Q:** So it happened on the 6th or the 7th of August?

**A:** Something like that, around there.

**Q:** That's when the LFL was exceeded in one of these piles?

**A:** Correct. That's when it reached the autoignition temperature.

**Q:** Okay. So the LFL was exceeded, and by definition, you had autoignition?

**A:** Not by definition.

**Q:** Well, how did you wind up with autoignition just because you reached 18,000 parts per million?

**A:** Well, there's a couple ways. A -- well, the first is if you have diphosphines being generated, and that can ignite an ambient temperature. And then the

second way is if you actually have the temperature driving that to the autoignition temperature, which I've seen in a range from a hundred to 300 degrees Fahrenheit. You've got the pyrophoric nature of -- of phosphine that, under very low oxygen concentrations, you can get to ignite.

**Q:** Okay. The first way was with diphosphine, and second way was what?

**A:** Well, you're -- the temperature is increasing, and you're generating the temperature so that you're getting to the autoignition temperature, which again I've seen range from like a hundred to 300 degrees Fahrenheit.

**Q:** Haven't you seen it at a hundred degrees Celsius?

**A:** Well, I've seen it as 150 C. That's why I'm saying 300 Fahrenheit.

**Q:** Okay. And what evidence do you have that that temperature will be attained as the result of this reaction?

**A:** Well, we've seen some testing done by Dale Mann where he shows you getting high -- high temperatures being generated in the pile.

**Q:** Not a hundred C?

**A:** Not a hundred C, but that was with his

particular pile size, his particular pile configuration, the moisture content, the humidity, et cetera.

**Q:** And what did Dale Mann say about when the highest temperatures were reached in relation to the concentration of phosphine gas?

**A:** He said there was a delay. There was a -- they didn't co-exist at the same time, but that was in his testing of a hundred tablets, in his configuration.

**Q:** Having seen that, don't you think it makes sense to go out into a laboratory and say, "You know what? I can get it to do that at the same time"? You don't think that makes sense?

**A:** No. I don't need to do that. Again, I know science says it's going to happen. All the other reasons I've listed shows it's going to happen.

**Q:** And the fact that there's a report that says it isn't going to happen done under laboratory conditions with a forensic chemist conduct -- conducting the testing, that doesn't persuade you that there's just the slightest little chance that you might be wrong?

MR. GOLDSTEIN: Objection.

THE WITNESS: No, no, not at all. I mean, he stopped at a hundred tablets, again, and he almost reached the LFL with a hundred tablets. And so you add more tablets to that, you will reach the LFL.

And that's given his pile configuration. And again, we have field experience. We have -- people applying have seen it happening. We have flashing going on in flasks and in pails and in spent material. So we know it happens.

BY MR. EPSTEIN:

**Q:** How many fires did you get on September 4th, 2013?

**A:** I don't know what you mean.

**Q:** How many fires did you get from the piles of Fumitoxin tablets that you created that day?

**A:** Oh, we didn't get any. We weren't even trying. It wasn't the -- it wasn't the point of the testing, the demonstrations.

MR. GOLDSTEIN: Can we go off the record?

MR. EPSTEIN: Uh-huh.

THE VIDEOGRAPHER: Off the record at 1:05.

[DISCUSSION WAS HELD OFF THE RECORD]

THE VIDEOGRAPHER: On the record at 1:06.

BY MR. EPSTEIN:

**Q:** Showing you what we're going to mark as Exhibit 261.

[EXHIBIT NO. 261 MARKED FOR
IDENTIFICATION]

BY MR. EPSTEIN:

**Q:** Are you familiar with MDE Laboratories, Mr. Schumacher?

**A:** I am.

**Q:** Are they a reputable forensic laboratory?

**A:** I think so, yes.

**Q:** Have any experience with Dale Mann?

**A:** I've met him a few times.

**Q:** Have you come to any particular conclusion about his capabilities as a forensic chemist?

**A:** I don't know him very well.

**Q:** Go, if you would, to page 10 of his report.

**A:** Yes.

**Q:** We're going to go through this, and I'll ask you questions about it. I'll read to you what I'm interested in having you soak in, and then I'll ask you my questions.

He said on the third conclusion -- or the third paragraph after "Conclusions," "When Fumitoxin tablets are piled, the reaction to form phosphine occurs only at locations within the pile that have access to moisture. Lack of elevated temperatures and lack of physical change to the morphology of the core tablets

demonstrate that little moisture diffused past the outer shell of the unspent tablets, rendering the core environment a somewhat dry and nonreactive zone for a time."

Do you have any reason to doubt that that's exactly what happened in his testing?

**A:** Well, no, not in his testing. I mean, in that particular set of tests, that's maybe what -- maybe what he observed.

**Q:** If the pile were 200 tablets as opposed to 100 tablets, why do you believe what he concluded there would be any different?

**A:** Well, I mean, you may still have the similar situation, but again, you're generating phosphine at a higher concentration because you have 200 tablets versus a hundred tablets. And so you're going to reach the LFL with 200 tablets if you couldn't with a hundred. I mean, it's -- it's -- the more tablets you have, the more likely you're going to be to reach the LFL, because more of the surface area will be reacting because you have a bigger pile.

**Q:** Wouldn't you actually have a bigger reaction if you had 200 tablets not piled but sitting right next to each other, all with the ambient air available to react as opposed to in a pile where the core is not going

to react?

**A:** You may have more reacting, but you're not going to have a higher concentration when you spread them out versus if you put them in a pile.

**Q:** Can you have it both ways? Can you have the ambient air getting in sufficiently to cause the reaction at the same time containing those gases and not having them diffuse?

**A:** I guess I don't understand your question.

**Q:** I'll withdraw it.

He said, "The tendency to have a progressive reaction zone prevented all the tablets" --

**A:** Where -- where are you?

**Q:** I'm just reading the next sentence.

**A:** Oh, you're reading.

**Q:** "The tendency to have a progressive reaction zone prevented all the tablets from reacting simultaneously, limiting the total concentration of phosphine at any one time."

Isn't that exactly what's going to happen irrespective of the size of the pile, Mr. Schumacher?

**A:** You will have some limitation, but the larger the pile, the more phosphine will be generated, and you will have higher concentrations.

**Q:** It says, "The number of tablets available for

reaction decreased with time as the surface area of the reactive zone shrank."

Irrespective of the size of the pile, that statement is going to be true, isn't it?

**A:** You may get some shrinking, correct.

**Q:** So where -- where, specifically -- I had you tell me in your ignition scenario how you got to the LFL. Where, specifically, are you getting to the LFL?

**A:** Well, you're getting to the LFL somewhere within the pile, and if you look at Dale Mann's testing, he had like almost 15,000 parts per million near the center of the pile. That's where he measured it. And on the outer, it was less. And it's -- so it's going to be closer to within the pile itself. I mean, his testing demonstrates that.

**Q:** His testing demonstrates you can get as high as 15,000 parts per million.

**A:** With a hundred tablets, correct. You add more tablets, you will reach the LFL.

**Q:** So you're saying if you went to a laboratory and said, "I'm going to do the same testing Dale Mann did, the exact same ambient conditions. We're going to use a pile of 300 tablets," you're a hundred percent sure that you would get 18,000 parts per million, correct?

**A:** I'm very confident you would, yeah.

**Q:** Okay. And it wouldn't be difficult to design that test? Heck, the test is already designed, isn't it?

**A:** It wouldn't be difficult to design it?

**Q:** You could -- you could do the exact same thing that Dale Mann did and just increase the number of tablets and get your LFL, correct?

**A:** Sure. I don't need to do that, though. I know it's going to happen. That's the point.

**Q:** And if Dale Mann had done this test at 200 tablets, you would have said, "He needed to do 300." And if he had done 300, you would be saying, "He needed to do 400," right?

MR. GOLDSTEIN: Objection.

THE WITNESS: I -- first off, that's totally a hypothetical question, but you need to do the number of tablets that are representative with when you're throwing in 49,000 tablets. So, you know, what that limit is is what you need to establish. He stopped at a hundred, and I don't think that's accurate. He only did a few tests at a hundred. I don't think that's statistically significant.

BY MR. EPSTEIN:

**Q:** And of course you know that Mr. Lilley and Mr. Turner created piles that were in excess of a hundred

Fumitoxin tablets, correct?

**A:** Well, I think they created piles that were significant in size. I wouldn't be surprised if they were, you know, much greater than a hundred.

**Q:** The fact is you have no earthly idea whether they created piles, let alone how many tablets might have been in those piles, correct?

MR. GOLDSTEIN: Objection.

THE WITNESS: Based on a reasonable degree of engineering certainty, the way they applied it would have created piles.

BY MR. EPSTEIN:

**Q:** How many tablets were in the piles that they created?

**A:** That, I can't tell you.

**Q:** Then how can you render an opinion in this case as to that being the cause of the fire when you know that a pile of a hundred tablets under adverse conditions isn't going to reach the LFL?

**A:** Well, I mean, you're -- you're looking at one aspect of the investigation. You have to look at the whole process that we go through to determine what the cause is. And so you go through and you look at the viable or potential ignition scenarios, and you compare them to the available evidence, and you realize that

heating to -- self-heating to ignition is not the cause of this fire.

And so then you look at the way that things were applied, and you look at the literature and the science, field experience, manufacturer's information, and it says that this will happen.

**Q:** All of the literature says this, quote, will happen?

**A:** It says it can happen. And so then, when you look at potential ignition source, is it more probable than not that ignition occurred as a result of piling, and the answer is yes.

**Q:** And based upon Dale Mann's testing under adverse conditions significantly more adverse than the Severn peanut dome, you would have to conclude they had piles in excess of 100 tablets in the Severn peanut dome, correct?

MR. GOLDSTEIN: Objection.

THE WITNESS: Well, that's -- that's the test he did with a hundred tabs. And you can see when you change from 100-tablet test to another hundred-tablet test, you have significant differences. And so you can't say -- you can't back out and say, yeah, a hundred -- a hundred wouldn't have done it. In those particular tests, a hundred almost reached the LFL. Change the

configuration a little bit and you very potentially could get there.

BY MR. EPSTEIN:

**Q:** Okay. Go ahead and in the -- read out loud, for the benefit of the record, the last paragraph on page 10 of Mr. Mann's report.

**A:** "During the time period of maximum production of phosphine, the core temperature (not yet reacting) remained at ambient temperature, well below that required for spontaneous ignition. This testing clearly demonstrated the two conditions for spontaneous ignition of phosphine never coexisted. It is unreasonable to expect the simultaneous conditions required for spontaneous ignition to ever exist unless liquid water comes in contact with Fumitoxin tablets."

**Q:** So Mr. Mann is just wrong about that?

**A:** I think -- yes, I think he's wrong about that -- that basic general conclusion on the few tests that he did.

**Q:** So if you had run the tests that we've talked about in the laboratory near Denver, Colorado, you would have shown the co-existence of the autoignition temperature of phosphine gas and 18,000 parts per million, correct?

**A:** Well, I -- I would have shown at some point

that you were going to get to the LFL. Now, whether or not you recreate the ignition mechanism, that's questionable because you can't control all the parameters; for instance, the diphosphines being present, the pile how it's going to react, et cetera.

**Q:** You've now twice mentioned diphosphines being present. Mr. Schumacher, what evidence do you have that there were diphosphines present in any one of the 49,000 Fumitoxin tablets applied on August 4th, 2009?

**A:** Well, I don't have any -- I can't point to any evidence, but that is one of the ignition mechanisms by which these piles ignite.

**Q:** Did you read Mr. Ryman's expert report?

**A:** I did.

**Q:** I'm not sure I have it. Come back to that.

Mr. Ryman's report indicated -- and if you'll recall reading it -- that he didn't think that would be true at all that there were diphosphines present in any of the Fumitoxin tablets that were applied that were supplied by his company.

**A:** Okay.

**Q:** Is he wrong?

**A:** I don't know how he'd know that. They don't do quality control on their -- on their project -- on their tablets. So there's no way he can say that.

**Q:** How do you know they don't do quality control on their tablets?

**A:** They don't -- they don't actually test their tablets for excess phos- -- phosphorous.

**Q:** And where do you get that information from?

**A:** His deposition.

**Q:** Okay. So despite the fact that the person who is the lead technical person at Degesch America that supplied the tablets said there is -- it is extremely unlikely that there are diphosphines present in the Severn peanut dome, in those 49,000 tablets, you believe you can state to a reasonable degree of engineering certainty there were diphosphines present?

**A:** I'm saying he has no way of knowing if there was excess phosphorous in those tablet formulations. And I can't say if they were there. I'm telling you that's one of the ignition mechanisms whereby you can get the pile to ignite and not have to get significantly high temperatures.

**Q:** But it's utter speculation to conclude that there were diphosphines present in the Severn peanut dome, correct?

**A:** It is not. It's -- it's based on a reasonable degree of engineering certainty. You either have the diphosphine present or you generate the high

temperatures or you have the pyrophoric nature going on. That's your -- those are your potential ignition mechanisms.

**Q:** Sir, all you're doing is taking circumstances that are known to create conditions to cause a fire, and you're applying them to the Severn peanut dome; isn't that right?

**A:** I'm looking at the -- the whole process of how you go about determining what the cause of the fire is, and what you're asking me is to look at one small part. There's a lot of other stuff that goes behind that, and when you eliminate self-heating to ignition of peanuts, you're left with one cause. And it's known when you pile tablets, that under certain circumstances you will get ignition.

**Q:** You are left with one potential cause that still has to uniquely fit the circumstances of the case in order for you, as a fire scientist, to conclude that it is the cause; isn't that right?

**A:** That's right, and it does.

**Q:** Do you agree that it's very difficult in the absence of a sustained heat source to raise the temperature of peanuts to the point where combustible gases from the peanuts will be given off?

**A:** Say that --

**Q:** Sure.
**A:** Ask me that one more time, please.
**Q:** Do you agree that it is very difficult to heat peanuts to the point that they reach their ignition temperature -- strike that. Let me try again.
Do you -- do you agree that it is very difficult in the absence of a sustained heat source to raise the temperature of peanuts to the point that it -- they will produce combustible gases?
**A:** Absence of a heat source?
**Q:** A sustained heat source.
**A:** I don't know. It -- it sounds reasonable, but I'm not sure.
**Q:** Don't you think it's something you should know since your conclusion is that you had a fire to peanuts as the result of -- your hypothesis -- the lower flammable limit of phosphine gas? Don't you need to know whether that scenario is sufficient to ignite the peanuts?
**A:** I guess I'm confused what your question is. You're asking about an external heat source creating flammable gases is what I thought you asked me.
**Q:** Okay. Don't you need flammable gases in order to have a fire?
**A:** Combustible gases, yeah.

**Q:** Sure, yeah.

**A:** I thought you were talking about the generation of like some sort of odd flammable gas in the space. You're talking about absent a heat source, it's -- you can't drive to the point where you're going to create gas that will be ignited --

**Q:** From the peanuts.

**A:** -- from the peanuts? Yeah, I would agree with that.

**Q:** Okay.

**A:** Now I understand -- I didn't understand what you were asking me.

**Q:** And let's take it the other way. The peanuts at some point were on fire. We all know that, correct?

**A:** Right.

**Q:** And what initially got the peanuts to be on fire was their temperature being raised to the point that they produced combustible gases, correct?

**A:** Right.

**Q:** Okay. What raised the temperature of the peanuts to the point, in your scenario, that they produced combustible gases?

**A:** Well, you've got the ignition of the phosphine gas, which will create a small fire on top of the -- the tablets, and tablets are known to smolder. So

that's one possibility. The other is flashing and igniting thermally thin materials, like I've talked about before.

**Q:** So you believe it's plausible that the tablets themselves were on fire, and that's what raised the temperature of the peanuts to the point that they produced combustible gases?

**A:** It's possible. These tablets are prone to smoldering.

**Q:** And that smoldering was going to raise the temperature of the peanuts adjacent to those tablets to the point that they were capable of producing combustible gases?

**A:** Right. That's one way. And the other way is the flash, which then ignites the thermally thin materials.

**Q:** A flash in sci- -- in fire jargon is no different than the word itself. It happens in a flash, doesn't it?

**A:** And it can ignite thermally thin materials, right, that could then start to smolder, like we had in this case.

**Q:** The flash itself can't raise the temperature of the peanuts to the point where combustible gases are going to be produced from the peanuts, correct?

**A:** It's going to raise -- it's going to ignite the thermally thin materials, that will then smolder and start burning and ignite the actual peanuts themselves.

**Q:** So not only did you need a pile of Fumitoxin tablets in some unknown number, but that pile of Fumitoxin tablets had to be perfectly situated on top of thermally thin materials such that the flash from the ignition of the phosphine would ignite the thermally thin material so that subsequently the peanuts could produce combustible gases. Did I get it right?

**A:** That's -- you said a lot there. Can you repeat that again?

**Q:** I'll take it one step at a time. You had to have a pile of Fumitoxin tablets sufficiently large to get the reaction that you have described that would cause 18,000 parts per million of phosphine gas being contained, correct?

**A:** Well, 16,000 is a -- LEL is a range. So it can be 16,000.

**Q:** So now you're down to 16,000 as causing the autoignition of phosphine gas?

**A:** Well, I said in my report there's a range of 1.6 to 1.8 percent. And so, to be fair, you're not necessarily talking 18,000; you're talking 16,000.

**Q:** Okay. All right. But you have this pile,

and if this pile is sitting on peanuts that Hampton Farms produced and put in bags and you put on a pile on a tarp somewhere for an experiment, that flash that you're describing will not result in a fire, will it?

MR. GOLDSTEIN: Objection.

THE WITNESS: I'm not sure. You're talking about different peanuts. You're talking about peanuts that are farmers stock with other material in them versus peanuts that have nothing in them but the actual peanuts themselves.

BY MR. EPSTEIN:

**Q:** All I'm talking about is actual peanuts themselves that are good enough to eat coming out of Hampton Farms bag. And if you have your pile of Fumitoxin tablets sitting upon them and you create your flash, you're going to have a nice little flash, and a couple of those peanuts might char a little bit. There's not going to be a fire, is there?

MR. GOLDSTEIN: Objection.

THE WITNESS: Well, I mean, that's a scenario I don't know all the -- the question -- I don't know all the situations or parameters in that question, actually. Do you have thermally thin material in there or not? Are we talking about stuff that's just peanuts? Because if you --

BY MR. EPSTEIN:

**Q:** We're talking about what you would buy from a grocery store.

**A:** Right. And so that's a different situation than what we're talking about in a -- in a dome.

**Q:** I just want to make sure we're clear.

**A:** Yeah.

**Q:** If you bought them from the grocery store, laid them out, and put your pile of Fumitoxin tablets upon them, you might get a flash, according to your theory of this case, but you're not going to get a fire, are you?

**A:** Well, you're assuming that the -- the pile of tablets do not start smoldering because they are prone to smoldering. So when you have a smoldering fire in this situation, you can ignite those.

**Q:** Okay. But to hedge your bets, you're suggesting that it just so happened that when Mr. Lilley and Mr. Turner piled their Fumitoxin tablets on August 4th, 2009, those tablets happened to land in an area on the surface of the pile where there was thermally thin material that also ignited, correct?

MR. GOLDSTEIN: Objection.

THE WITNESS: Like I said, that's one of the ways it's going to ignite. The other is the

smoldering of the tablets, which will then ignite the thermally thin materials and the peanuts. So there are two different ways.

BY MR. EPSTEIN:

**Q:** So for your hypothesis in this case to be correct, first there had to be a pile of Fumitoxin tablets created from the application that was done by Brian Lilley and Randy Turner, correct?

**A:** Yes.

**Q:** And naturally, that would have been on the surface of the peanuts since they weren't going to be driven into the peanuts, correct?

**A:** Right.

**Q:** And one of two things then had to happen. Well, first of all, the first thing that had to happen was the LFL needed to be reached, correct?

**A:** Right.

**Q:** Of phosphine?

**A:** Unless you're dealing with a pyrophoric where you can actually get 10,000 parts per million and have ignition that way.

**Q:** That's not your theory in this case, is it?

**A:** That's one of the ignition mechanisms.

**Q:** The pile of phosphine gas -- I'm sorry. The pile of aluminum phosphide tablets had to confine

sufficient phosphine gas to eventually lead to the autoignition of the phosphine gas in your scenario, correct?

**A:** Yeah. Generate the phosphine quick enough so that you get it autoignition.

**Q:** Okay. So that's the next step. And then the next step that had to happen for your hypothesis to be correct is either there had to be smoldering of the Fumitoxin tablets themselves or there had to be material right where that pile was that was thermally thin and capable of being ignited by a flash, correct?

**A:** There's an and/or component. You could have both going on. And so I would agree that if you said and/or, yes.

**Q:** Okay. And in your opinion, that's how this fire started?

**A:** Yes. I mean, this -- this happens. People see it happen.

**Q:** Have you done any testing at all to establish that scenario that we have just walked through?

**A:** I think we've talked about that. No. And again, I don't need to do that testing.

**Q:** Now, the fire triangle requires at one of its legs oxygen, correct?

**A:** Yes.

**Q:** So --
**A:** An -- an oxidizer.
**Q:** An oxidizer. Well, in this case, the oxidizer was oxygen, correct?
**A:** Right; but I was answering your -- your question.
**Q:** So we know that there was sufficient oxygen present, whatever the cause of the fire was, for there to be combustion, correct?
**A:** Right. Initially, sure.
**Q:** All right. And so, in your scenario, right where the Fumitoxin pile was, there was sufficient oxygen to lead to ignition and combustion, right?
**A:** Right.
**Q:** Right. Any idea why if there was sufficient oxygen present to permit the ignition and combustion of the combustible materials you wound up with a smoldering fire instead of a flaming fire?
**A:** Because you're starting off with a smoldering fire with whatever ignition mechanism you're talking about, and that smoldering fire can sit there and smolder. Eventually does it transition into flame at some point? Possibly. But throughout most of the time this is burning, it was a smoldering fire. You're in a very confined dome, very tight dome.

**Q:** When you say "confined," what do you mean? There were hundreds of thousands of cubic feet of head space, correct?

**A:** Right.

**Q:** And the fire was, by your theory, on the surface of the peanut pile, correct?

**A:** Correct.

**Q:** Why didn't something that was smoldering very quickly become flaming?

**A:** Because they don't always become flaming. Your smoldering fires can smolder forever. It depends on the material. For instance, peanuts can smolder. And so it depends on the sub- -- if you're talking about, for instance, a couch, surface fire, it's going to -- it's going to flame. But when you're talking about peanuts, you can have smoldering taking place for most of the time.

**Q:** Even with an abundant supply of oxygen?

**A:** Yeah.

**Q:** Okay. Do you have any literature that you can point to that peanuts, when they are ignited, smolder as opposed to flame?

**A:** When you say they're ignited, I mean, if they're ignited by a smoldering mechanism, they can smolder. If you're -- I mean, I'm not sure what you

mean. If you pour gasoline on them and light them, they would probably -- probably flame.

**Q:** Is there any literature you've come across in this case which suggests that when peanuts are ignited by a smoldering source of ignition, that the peanuts will smolder rather than flame?

**A:** I haven't looked at that or seen that, no.

**Q:** So how often will a dry pile of aluminum phosphide tablets that's 200 tablets or more result in phosphine gas reaching its lower flammable limit? How often will that happen?

**A:** Well, I don't know how often it will happen, but there will be a pile size that you will reach the LFL almost every time.

**Q:** Almost every time?

**A:** Yeah. Given the same configuration, you will -- and you have the same pile, the same number, same relative humidity, same moisture content, almost every time you're going to. It's just a matter of science.

**Q:** Just a matter of science. So under proper laboratory conditions, 90 percent relative humidity, 90 percent -- 90 degree temperature, at the right size, you can reproduce over and over and over again the attainment of the lower flammable limit of phosphine gas?

**A:** Right; at a certain pile size. I didn't say every time. I said frequently, high degree, yes. You can never always recreate it exactly the same, though.
**Q:** All right. Is there any peer-reviewed literature you have come across in any scientific journal that supports what you've just said?
**A:** That supports what? I just --
**Q:** That if you create a dry pile of aluminum phosphide tablets at some size, you will almost every time reach the lower flammable limit of phosphine gas?
**A:** I haven't seen any peer-reviewed stuff, no.
**Q:** Not a single one, right?
**A:** No. I haven't seen anybody test that.
**Q:** How many times in your career have you stated an opinion to a reasonable degree of engineering certainty as to the origin and cause of a fire that is not supported by physical testing or peer-reviewed literature?
**A:** Well, that's not what happened in this case, but a lot of the fires I investigate, you don't do testing. It's not often that you actually do testing --
**Q:** Okay.
**A:** -- on a case.
**Q:** My question, though, is, how often have you expressed an opinion to a reasonable degree of

engineering certainty as to the origin and cause of a fire that is not supported by a single piece of peer-reviewed literature or a single physical test?

**A:** I don't know the answer to that.

[EXHIBIT NO. 262 MARKED FOR IDENTIFICATION]

BY MR. EPSTEIN:

**Q:** Okay. Let me show you what's been marked as Exhibit 262.

**A:** Before we get going, can I go to the bathroom?

MR. EPSTEIN: Absolutely. Let's break.

THE VIDEOGRAPHER: Off the record at 1:33.

[RECESS TAKEN]

THE VIDEOGRAPHER: On the record at 1:42.

BY MR. EPSTEIN:

**Q:** Mr. Schumacher, I've handed you Exhibit 262.

Can you tell me what Exhibit 262 is?

**A:** Yes. It's a paper I did for the International Symposium on Fire Investigation Science and Technology in 2012.

**Q:** Was this paper ever published anywhere?

**A:** In the proceedings in the International Symposium on Fire Investigation Science and Technology.

**Q:** Okay. That's not a peer-reviewed or refereed journal, is it?

**A:** That's correct.

**Q:** Okay. And, in fact, you wrote what you wanted to write, along with Mr. Jason from your company, and it was printed exactly as you wrote it, correct?

**A:** Right. And we had Barry Lindley review it, peer review it.

**Q:** Yeah. But Barry Lindley is not a peer reviewer for the International Symposium on Fire Investigation Science and Technology, is he?

**A:** No; but he's a knowledgeable chemist.

**Q:** That's not the peer-review process as you know the peer-review process, correct?

**A:** Well, it's a peer-review process. It's not a peer-reviewed journal process.

**Q:** Okay.

**A:** Same concept.

**Q:** Okay. Barry Lindley is not an editor of a journal of -- he's not an editor for the International Symposium on Fire Investigation Science and Technology, is he?

**A:** No.

**Q:** And he's not someone who had been chosen to be a peer reviewer by the International Symposium on Fire Investigation Science and Technology, is he?

**A:** That's right.

**Q:** He's just somebody that you sent this article to and asked to look at it?

**A:** He's not just somebody. He's a knowledgeable chemist who understands these principles.

**Q:** You're familiar with Daubert? You've been around long enough to be familiar with what Daubert says about peer-reviewed literature, correct?

**A:** Yes.

**Q:** Exhibit 262 is not peer-reviewed literature, correct?

**A:** Well, I'm not sure what peer-reviewed in Daubert means. If it means a journal article, then this would -- a publication where there's an editing board that reviews it, then it's not a peer-reviewed article.

**Q:** And this is something you wrote as opposed to something you are relying on in deciding what your opinion in this case would be, correct? This is your own writing?

**A:** This is what I wrote, correct.

**Q:** Right. In other words, when you are looking to support your hypothesis in a given case as to the

origin and cause of a fire with literature, you're looking for what other people have found and said as opposed to trying to find your own articles, correct?

**A:** Well, not necessarily.

**Q:** Okay. Well, let's -- let's look at what you wrote here. By the way, who is Mr. Jason?

**A:** He works for us.

**Q:** Okay. Is he subordinate of yours?

**A:** I don't like using those terms, but yes, he works for us. He's employed by us.

**Q:** What is his role?

**A:** At the firm?

**Q:** Yes.

**A:** He's a -- he's a project engineer.

**Q:** Okay. All right. Go to page 568.

**A:** Yes.

**Q:** You have referenced there testing performed by Underwriting Laboratories on Phostoxin tablets in 1961, Phostoxin pellets in 1964, and Fumitoxin tablets and pellets in 1983, correct?

**A:** Yes.

**Q:** And as part of your preparation of this paper, you reviewed all of those studies, correct?

**A:** Yes.

**Q:** And what you write in this paper is that in

the absence of the introduction of liquid water, none of the testing performed by Underwriting Laboratories in any of those test series showed that a pile of aluminum phosphide tablets or pellets could be ignited, correct?

**A:** Right. The limited number of tablets and pellets that they used in their test sequence. That's correct.

**Q:** So you're critical in your paper that they didn't use enough tablets?

**A:** Right.

**Q:** Like you're critical of Dale Mann that he didn't use enough?

**A:** Well, he stopped at a hundred, right. He almost got the LFL. And so if he'd gone a little higher, he would have eventually got the LFL.

**Q:** So you do agree that nothing in those Underwriting Laboratory reports supports the conclusion that a dry pile of aluminum phosphide tablets will contain sufficient phosphine gas such that it will reach its lower flammable limit?

**A:** Right. In that limited testing with limited tablets -- number of tablets, limited pellets, limited pile size, that is -- that is correct, which is not really appropriate when you're dealing with real world applications.

**Q:** Did you review the Siemens testing that was in Degesch America's files that was the subject of part of Mr. Ryman's testimony?

**A:** Yes, I did.

**Q:** Okay. And although it's not referenced in your paper here, the Siemens testing resulted in the same conclusion, correct?

**A:** Yes. I think they used even -- even smaller quantities of that, and so that's not representative of real world situations.

**Q:** But dry piles of aluminum phosphide tablets tested in -- by Siemens did not result in the lower flammable limit of phosphine gas being reached or ignition, correct?

**A:** I'm not sure -- I need to look at that to see if they actually did dry piles or if they actually did smaller quantities.

**Q:** But there was no ignition in the absence of liquid water in that testing, correct?

**A:** Right; in the very small amount of aluminum phosphide that they were testing.

**Q:** Okay. You have reviewed the deposition testimony of Lester Rich, correct?

**A:** Yes.

**Q:** Let me show you what we're marking as

Exhibit 263.

[EXHIBIT NO. 263 MARKED FOR IDENTIFICATION]

BY MR. EPSTEIN:

**Q:** You can read as much as you want or as little as you want, but I'm going to point you to the questions and answers that I want to talk with you about.

**A:** Okay.

**Q:** All right. I'm starting on page 139. I asked Mr. Rich, "In fact" -- this is line 7 -- "in none of those Underwriting Laboratory reports was any ignition ever obtained in the absence of the introduction of liquid water; isn't that correct?"

He answered, "Absence of -- yes. I believe it is -- I believe they said liquid, yes."

Okay. You agree with that, correct?

**A:** Do I agree with that's what he said?

**Q:** Do you agree that Mr. Rich is correct in his analysis of the Underwriting Laboratory reports?

**A:** Yes. And again, with the caveat that we're talking small amounts.

**Q:** Okay. On line 20, I asked him, "Your testimony in this case is that there was no liquid water that was introduced into the piles, as you've called them, of aluminum phosphide tablets left by the IFC

applicators?"

Answer. He said, "That's correct. To my knowledge, there was no liquid water introduced."

You agree with that, correct?

**A:** Yes.

**Q:** All right. Page 140. I asked him, "And yet you believe you had this runaway reaction that you've been talking about, and that's what caused the fire?"

He said, "Correct."

I asked, "The Underwriting Laboratory reports do not support that theory in any way, shape, or form, do they?"

His answer was, "Well, they did require liquid water to get their ignition of their small quantity of tablets."

And I asked, "And in the absence of that liquid water, there was never" -- "there never was ignition, correct?"

And he said, "That's right."

What he's testifying to is the same thing you're testifying to today, correct?

**A:** Right. And with the caveat that all of those tests with limited number of tablets and pellets in their piles.

**Q:** Okay. But you're in agreement with

Mr. Rich?

**A:** That that's what the testing showed?

**Q:** Yes.

**A:** Yes, I agree.

**Q:** Okay. Next, line 13. I asked, "Have you read the Siemens report?"

He said, "Yes, sir."

And I asked, "And the same is true in the Siemens report, correct?"

He said, "I believe that's correct. Which --"

I asked, "I don't see it listed. I'll hand" -- "I can hand you a copy, if you would like."

He said, "If you would, please. That might be at the very bottom of mine."

I said, "Which one?"

He said, "80 or 81 at the very bottom. I believe that's what you're talking about."

And I said, "Oh, yes. Yes."

And he said, "Let's look -- I don't remember that one as well as the UL. So let me take a look at that real quick. Do you have --"

I said, "I do."

He said, "Let's take a look. I think you are correct, but if you won't mind me looking."

I marked it as Exhibit 195, and he -- it was then marked.

And he said, "That" -- "That was that very beginning. Yeah, you're correct."

So his ultimate answer was "You're correct." You have no different recollection of the Siemens report, and I'll show it to you, if you want.

**A:** Can you show me it?

**Q:** Absolutely. And apparently it's already been marked as Exhibit 195.

**A:** No. I -- I agree that they did not get ignition, but again, I point to the fact that these are small quantities.

**Q:** Okay. They did pile, correct?

**A:** I need to -- if you can point me to that.

**Q:** It would take me too long to get to it.

**A:** Okay. Let me -- let me take a look here.

It looks like they're using 2 millimeters of substance.

**Q:** Okay.

**A:** So, I mean, you're talking significantly small. A pile with a size approximately 2 centimeters in height by 3 centimeters in diameter. So again, very, very small quantities of material.

**Q:** Piled together?

**A:** Right. But significantly small quantities.
**Q:** All right. I want to keep going with Mr. Rich's testimony.
**A:** You want that back?
**Q:** Sure.
So after we talked about the Siemens report, I then asked him, on line 12, "Did you recently receive from Mr. Widis the report undertaken by MDE Labs in this case?"
He said, "Yes."
I asked, "Did you review the various types of testing that MDE Labs did in relation to this case?"
He said, "Yes, briefly."
I asked him, "And like the UL reports and like the Siemens report, did that testing show that in the absence of the introduction of liquid water, piles of aluminum phosphide tablets did not result in combustion?"
He said, "That's correct. I believe their tests resulted in no combustion."
That true -- that is true as you have read the MDE Lab's report, correct?
**A:** Right. With the amount of tablets that they've tested in those configurations, that's correct.
**Q:** All right. I want to go back to your article.

**A:** Are we done with this?

**Q:** We're going to come back to it; so have it someplace where you can find it.

**A:** What page are you on?

**Q:** I'm going now to page 574. And just to make sure we're clear on this: The case study that you're describing in this paper is the wheat bin where there was probing of aluminum phosphide tablets into the wheat, correct?

**A:** Yes.

**Q:** And this turned into a legal case in which you were retained as an expert witness, correct?

**A:** Yes.

**Q:** Okay. And that's the one that never went to trial, correct?

**A:** Correct.

**Q:** You were deposed in that case, however, right?

**A:** Yes.

**Q:** Okay. Bottom -- the very bottom paragraph, you noted that, in the second sentence, "The fire started as a smoldering fire and transitioned to a flaming fire after reaching the surface," correct?

**A:** Where are we?

**Q:** Second sentence in the last paragraph.

**A:** Second sentence, last paragraph. Okay.
**Q:** So that's -- that's how that fire started, smoldering, and once it reached the surface, flaming, correct?
**A:** At some point, yes, it transitioned to a flaming fire.
**Q:** Okay. Why would it be smoldering in the interior of the pile and flaming on the surface of the pile?
**A:** Well, just the availability of oxygen in that particular case.
**Q:** And there was more oxygen in the head space in the Severn peanut dome than there was in this metal bin, wasn't there?
**A:** Right. But you can't compare the two. I mean, you're dealing with a fire that starts on the surface as a smoldering fire, and it's going to smolder for a long time. Is it going to transition to flaming at some point? Possibly. But the majority of the time, it will be smoldering.
**Q:** You said here that "The exact time the fire started was unknown. One possibility was the fire started fairly early after the fumigation and went undiscovered because the smoldering was deep inside the pile of grain."

That wouldn't explain why our fire wasn't discovered on August 6th or August 7th when you say "The fire started," would it?

**A:** Say that again. I'm not sure what you mean.

**Q:** The explanation you give here as to why this fire wasn't discovered for 16 days wouldn't apply to the Severn Peanut case, would it? The first explanation --

**A:** You mean as far as fire on the surface from aluminum phosphide?

**Q:** Correct.

**A:** Right. There are other reasons why.

**Q:** Okay. But here, your conclusion was the fire wasn't discovered because it was deep within the pile.

**A:** Right. And there's another possibility there, too.

**Q:** Okay. And the other possibility was that it started when the fan started. That wouldn't apply to Severn Peanut Company either, would it?

**A:** That's correct.

**Q:** Okay. So the two explanations you gave for a delay in the discovery of the fire that you investigated in the wheat bin, neither of those would explain why there was a delay in discovery in the fire in the Severn Peanut case, would it?

**A:** That's right.

**Q:** Okay. Now, your conclusion in this paper is actually carried over into your report in this case and your conclusions in this case, correct?

**A:** Yeah. Generally, I would say they're --

**Q:** You actually list the same factors on page -- on page 11 out of 14 of your report, you have the exact words from your conclusion in your paper, Exhibit 262, correct?

**A:** I haven't looked at it, but they're very similar, if not exact.

**Q:** Okay. You just carried that paragraph from your paper over into your report in this case, pretty much, correct?

**A:** Right; because it's consistent with the two cases.

**Q:** And in both, you say, as No. 2, "Water in the form of a liquid or vapor comes in contact with the fumigant." That --

**A:** No. I said, "Moisture in the form of a liquid or vapor."

**Q:** Okay. So you have changed a word, correct? Look in your paper.

**A:** Right. This is a general paper, right?

**Q:** Uh-huh.

**A:** This is talking about general ignition of

aluminum phosphide tablets and pellets. This is more specific in the case we're on now.

**Q:** Well, in both your paper and your report, you're talking about ignition scenarios in agricultural storage structures where there's been an application of aluminum phosphide, correct?

**A:** Right.

**Q:** And what you said in your paper was that water, in the form of a liquid or vapor, comes into contact with the fumigant, correct?

**A:** Okay.

**Q:** And you changed the word "water" to "moisture" in this report and left everything else the same, correct?

**A:** Water, to me, is moisture. Moisture is water. Water is H2O. It comes in several different forms: liquid, gas, solid.

**Q:** Okay. The fact of the matter is, to the extent that there is literature out there reporting fires as the result of the application of metal phosphides, the vast majority of that literature talks about liquid water, doesn't it?

MR. GOLDSTEIN: Objection.

THE WITNESS: I don't agree. There's a bunch of literature that talks about moisture. It talks

about piling. It talks about dome pile, because you can get ignition. There are case studies that show that there was no liquid water involved in the ignition of aluminum phosphide tablets or pellets in piles. There's field experience showing that.

BY MR. EPSTEIN:

**Q:** Tell me every case study that you're talking about. Is there any case study that's referenced in your expert report in this case?

**A:** Yeah.

**Q:** Tell me what they are.

**A:** It may be "case study" isn't necessarily the correct -- no, it is. Actually, it is correct. It's investigations that were done related to incidents where aluminum phosphide caused a fire and explosion.

**Q:** Okay. No different than you writing about your experience with this wheat bin. There are other such materials out there that you can find where somebody like you reported on a single incident in their investigation of what happened.

**A:** Or an entity like the State of California that did an independent investigation related to an incident.

**Q:** Right; a single incident.

**A:** Right. But there are incidents out there

that have been reported on --
**Q:** Okay.
**A:** -- and investigated.
**Q:** Okay. That's what you're relying on in this case. You're not relying on a case study that has done some form of a global or generic investigation of aluminum phosphide tablets or pellets, correct?
**A:** I'm relying on case studies where people have investigated the cause of a certain fire and explosion related to this particular material and they have concluded that there was no liquid water involved.
**Q:** Okay. And that's what you conclude in this paper, Exhibit 262, correct?
**A:** I concluded in the paper in general, or what are you talking about?
**Q:** Regarding the wheat bin fire.
**A:** The wheat -- yes, that's correct.
**Q:** Okay. And that wheat bin fire resulted following the application of aluminum phosphide tablets into the interior of the commodity pile, correct?
**A:** Yes.
**Q:** Which is a different application than occurred in the Severn Peanut case, correct?
**A:** That's correct.
**Q:** And you know there was piling in that case

because the tablets went in, in a pile, correct?

**A:** Right. The way they probed them.

**Q:** Right.

**A:** Right.

**Q:** Randy Turner and Brian Lilley didn't probe the tablets into the peanut mass in this case, did they?

**A:** No. They just dumped them in and created piles on the surface.

**Q:** That was their testimony that they dumped them in -- dumped them in and created piles, right?

**A:** Well, no. That's -- they talked about slinging it and moving them around, but that would have generated piles.

**Q:** Despite the fact that their testimony was they specifically looked on the surface directly beneath them and there were no piles. They were either wrong about that or they lied about it?

**A:** Well, I think they're inaccurate, and they're wrong about that.

**Q:** So you know they created piles, even though you weren't there, you didn't have a flashlight, and you didn't look at the surface; is that correct?

MR. GOLDSTEIN: Objection.

THE WITNESS: Well, based on the description of how they applied them and all the other

things we've talked about, they would have piled the peanuts -- or piled the tablets on the peanuts, and it would have been difficult for them to really know if they piled when neither of them could describe what piling was. They couldn't describe a pile. They didn't know if it was bad to pile. They didn't know if piling could create a fire. They couldn't see the entire dome when they were applying it. They have a two-dimensional view when they're 20 feet above it; so they don't know if they have piling below in a recessed area because they can really only see length and width. There's other material in there like from a prior fumigation; so they don't know if they've actually put the tablets into that dust from the prior fumigation and if it's creating piles below that.

So there are a lot of reasons why what they're saying is inaccurate. They're looking in -- they didn't look in until they were done applying it. They had a flashlight to look into a dark dome, and it's difficult to determine the difference between the peanuts and the tablets. Number of reasons why I think their statement is inaccurate and is incorrect.

BY MR. EPSTEIN:

**Q:** And specifically, you have decided, to a reasonable degree of engineering certainty, that there

was one or more pile on the what you call ten-foot flat spot on the surface of the peanut pile, correct?

**A:** I said that's one area. There are other areas down the slope where you could also get piling.

**Q:** Show me where any witness in this case has described there being a ten-foot flat spot on the surface of the peanut pile?

**A:** I need -- do you have the depositions of --

**Q:** Well, I'll show you your report, because your report has 90 footnotes -- 93 footnotes, correct?

**A:** Yes. And that's why I'm saying, if you can give me the deposition stuff, we can look at it.

**Q:** Well, you're citing page 7 of 14. You wrote, on the last paragraph, "The peak of the peanut pile inside the dome was described as being about 15 to 20 feet from the top and had a small flat spot," and you have Footnote 42 and 43.

**A:** Where are you again? I'm sorry. What page?

**Q:** Page 7.

**A:** 7.

**Q:** Last paragraph.

**A:** Okay.

**Q:** And then you say -- and then you go on later and say, "In creating the drawings, it was assumed that the flat spot of the pile had a diameter of about ten

feet."

That's an assumption that you made. That's not something that somebody testified to, is it?

**A:** No. I think he described -- one of them described it as about a ten-foot flat spot.

**Q:** One of whom?

**A:** One -- Turner or Lilley, from what I remember. Or it was somebody else in July, whoever applied the Protect-It, but that's what I recall.

**Q:** Okay. Well, you've got Turner's deposition, page 144 to 145, cited, and Patrick Rowe's deposition, page 75. I will read you what those gentlemen said in those locations that you have cited.

**A:** Okay.

**Q:** Mr. Turner, page 145, line 10: "And tell me" --

**A:** Can -- can I see this for myself?

**Q:** Sure. Do you have your copies with you?

**A:** I -- I -- no.

MR. GOLDSTEIN: Why don't we go off the record.

MR. EPSTEIN: Sure. Let's go off the record.

THE VIDEOGRAPHER: Off the record at 2:06.

[RECESS TAKEN]

THE VIDEOGRAPHER: On the record at 2:17.

BY MR. EPSTEIN:

**Q:** Mr. Schumacher, it's my understanding that you've had a chance to review what you cited in Footnotes 42 and 43 regarding the depositions of Randall Turner and Patrick Rowe. Did you find anything in what you cited there that would lead you to the conclusion that somebody actually said they saw a ten-foot flat spot on the surface of the peanut pile?

**A:** Not in those two. They said flat spot, but I recall reading ten feet somewhere. And I don't think it's just my report, but I need to look at that a little more.

**Q:** Well, in your review of Mr. Rowe's testimony, did you not read, when he was asked was it completely flat, that he said, "It had flattened out on the top, but it was still -- it had a curve to it. So it wasn't completely flat structure, if I remember correctly."

You don't recall that?

**A:** I read that, but he's talking about it being flat, and there is some curvature on the outside, is what -- is how I read that.

**Q:** And what you say in your report is you

assumed that there was a ten-foot flat spot. You used the word "assumed," did you not?

**A:** Based on that drawing, yeah.

**Q:** On what drawing?

**A:** The drawing that was done to create the dome drawings.

**Q:** Okay. I've lost you. I don't know what you mean. The drawing that was done to create the dome drawings?

**A:** Right. The dome drawings that were done by John Cavaroc.

**Q:** Oh. He created something that looked like a ten-foot flat spot?

**A:** Right.

**Q:** Well, do you know what he was relying on?

**A:** I imagine the deposition testimony.

**Q:** Would you conceive the possibility that on August 4th, 2009, the top of the peanut pile did not have a ten-foot flat spot?

**A:** Well, I don't know. I remember that somewhere, and I'd have to review that a little more, but there certainly was a flat spot.

**Q:** And as of right now, you can't tell me how large it was or anybody that said how large it was?

**A:** As I sit here, I remember that, but I can't,

again, tell you.

**Q:** And your report doesn't cite any such testimony, does it?

**A:** That's right.

**Q:** Okay. Going completely off topic for a moment. What is a clinker?

**A:** A clinker is something that's used in the industry when you're talking about self-heating to ignition of a particular commodity. Could be hay. Could be other things.

**Q:** Okay. Could there be such a thing as a peanut clinker?

**A:** Well, I haven't seen one, but I imagine there could be.

**Q:** And if, in fact, there was one, what would it look like?

**A:** Well, I imagine it would be black.

**Q:** Okay. Would it be kind of glassy looking?

**A:** It could. Doesn't necessarily have to be.

**Q:** Okay. If such a peanut clinker were found in -- among the peanuts at the Severn peanut dome, would that be an indication that there was potentially self-heating to the point of ignition?

**A:** No; because you get -- well, possibly. You can also get clinkers from smoldering fires that have

nothing to do with self-heating.

**Q:** Isn't there something about a clinker that generally makes it more likely to be the result of spontaneous combustion?

**A:** I don't know of anything that makes it more likely, but you can have it both ways.

**Q:** Okay.

**A:** You can have clinkers made from just a surface fire, too.

**Q:** So if I were to show you a clinker that resulted from the Severn Peanut fire, you wouldn't be able to tell me one way or the other that -- whether that makes self-heating or your theory the more likely of the two?

**A:** Well, the reason why I -- the thing to consider is you can have clinkers that are related to a fire that starts on the outside as a flaming flyer -- as a flaming fire like in hay and it transitions in. You can create clinkers as it burns down. And so because you have a clinker doesn't mean that you have a self-heating-to-ignition reaction taking place.

**Q:** All right. Let's take a look at your report, Exhibit 246. And I want to look first at page 2, at the materials that you reviewed in this case.

**A:** Okay.

**Q:** Do you know if you received a transcript of every witness who had, by April 30th, 2013, provided sworn testimony?

**A:** I don't -- I don't know if I had or not.

**Q:** Did you make a request for all depositions that had been taken as of that point in time?

**A:** I probably made a request related to witnesses that would have been in and around the dome, talking about, you know, how they managed the -- the peanuts and things like that. Whether it be all 30(b)(6) witnesses and things like that, I don't know.

**Q:** Okay. Did you know that, prior to your report being issued, the deposition was taken of Degesch America's director of quality control, Dennis Ryman?

**A:** I'm not sure if I knew that or not.

**Q:** You had not been supplied his deposition testimony before you issued your report, had you?

**A:** That's right. Did we -- when was that deposition taken?

**Q:** The deposition was taken on April the 10th, 2013.

**A:** Okay. Then, no, I hadn't seen that.

**Q:** And, in fact, you didn't list it in your reviewed items because you hadn't seen it, correct?

**A:** That's right.

**Q:** And the first time you actually were looking at that deposition transcript, according to your invoices, the last page of Exhibit 248, was July 18th, 2013, correct?

**A:** That appears to be correct.

**Q:** I'm sorry. Let me back up. You started reviewing that deposition of Dennis Ryman on July 15th, 2013, correct?

**A:** Right.

**Q:** Two and a half months after you issued your expert report?

**A:** Correct.

**Q:** Having read Mr. Ryman's deposition, do you believe that's something you should have had access to before you rendered your opinions in this case?

**A:** I mean, certainly, I would have liked to, but it doesn't change my opinion.

**Q:** Okay. And the fact that he believes it's very difficult to contain phosphine gas to the point that you could reach the lower flammable limit, that doesn't affect your view of this case, even though he works for Degesch America?

**A:** That's right. I don't think he's investigated -- he's not a fire investigator, and he doesn't understand that process. And, you know, it

happens in the field so I'm surprised he says that that doesn't happen.

**Q:** And even though he's said he's many times been around phosphine gas where the concentration is well in excess of 18,000 parts per million with there being no autoignition, that doesn't affect your view of the likelihood of autoignition in this case?

**A:** No; because we know it happens. And we have people in the field saying they see it happen. And we have people -- we have literature showing it happens and case studies showing it happens.

**Q:** Would you agree that Mr. Ryman has more technical knowledge of Fumitoxin and its properties than you do?

**A:** I would say no.

**Q:** Okay. You first put your hands on a Fumitoxin tablet eight days ago?

**A:** When -- you can tell me when that was when the -- September 4th?

**Q:** Yes.

**A:** What's the date today? Eight days ago, sure.

**Q:** And you know as much about Fumitoxin as Mr. Ryman does?

**A:** Sure. The chemistry, absolutely. The

ability for it to ignite and start fires and that whole investigation process, absolutely.

**Q:** Even though he's been working with it for 18 years?

**A:** Right.

**Q:** You have, in your reviewed items, a deposition of Jack Kennedy. Can you tell me what the deposition of Jack Kennedy brought to bear on your opinions in this case?

**A:** Well, I think he was related to the EJ Cox case and the testing that they had done in that EJ Cox case where they actually aborted the testing because the piles that they had created were generating concentrations that they were not comfortable with from the standpoint of ignition.

**Q:** That was similar to your wheat case. That was probing; it wasn't piles on the surface of the commodity, correct?

**A:** Right; but there was no liquid water, which, you know, is important to note.

**Q:** Would you agree with me that the issue of confinement of phosphine gas is going to be completely different on the surface of a commodity pile versus in the interior of a commodity pile?

**A:** There will be some differences, yes, but

piles will confine it.

**Q:** Well, would you agree with me that in a wheat pile you're going to have confinement by the wheat in addition to the confinement by the pile of Fumitoxin?

**A:** I would agree with that.

**Q:** And the same would be true in a peanut pile like the testing that Mr. Kennedy performed, correct?

**A:** Sure.

**Q:** So you -- kind of apples and oranges. I understand what you're saying: There's no liquid water, and you're talking piles. But you're still apples and oranges if you're probing the Fumitoxin into the interior of a commodity versus putting the pile on the surface of the commodity?

**A:** Right. When you're talking about a perfectly flat surface, but if you have recessed areas, then you are getting closer to that confinement that you get when it's actually being probed.

**Q:** Okay. Is it your testimony in this case that the pile of Fumitoxin tablets or pile of Fumitoxin tablets that you have testified existed on August 4th, 2009, was in a recessed area in the surface of the peanuts?

**A:** Well, it's possible it was, yes.

**Q:** It's possible it wasn't?

**A:** That's right. But there were piles, and if it's in a recessed area, then it more closely resembled that of being within a pile as opposed to being on the surface.

**Q:** Okay. You also --

**A:** And you also have a situation when you drop the tablets. They don't just land on the surface; they actually bed themselves. And so you're still going to get some of that going on as well.

**Q:** You also have listed in your reviewed items deposition of Barry Lindley. What, if any, bearing did the deposition of Barry Lindley that you reviewed bare on your opinions in this case?

**A:** Well, he was there to testify about the EJ Cox case and the ignition scenarios, and his testimony -- I don't know that it really affected this case, but it certainly is consistent with what I think happens in these cases without having liquid water.

**Q:** Okay. You're not relying on anything that Barry Lindley testified to in that deposition to form any basis of any opinion you've expressed in this case, are you?

**A:** I would say generally, yes, that's true. I'm not relying on Barry Lindley or that deposition.

**Q:** Okay. Move to page 3 of your report, please.

Did you create this timeline on your own? Did you have somebody assist you? How did you put this timeline together?

**A:** I put it together myself.

**Q:** Okay. Did you know that it contained errors?

**A:** Well, if you'd point out what errors you think it contains, I will then be able to answer that question.

**Q:** You -- you have a date of October 6th, 2008, as the first load of 2008 growing season peanuts put into dome, and you have Exhibit 60. And they you're got --

**A:** Where is October 6th? Where do you see October 6th?

**Q:** On the left-hand side.

**A:** I see October 2005.

**Q:** No.

**A:** Oh, you're talking down 2008?

**Q:** Yes.

**A:** I'm sorry. I was looking at the top. Okay.

**Q:** Did you know that was wrong, that that was not the first load for the 2008 growing season of the peanuts put into the dome?

**A:** Well, if I had put that there, then I probably wouldn't think it was wrong. I'd have to have you show me where that is incorrect or give me the actual

dates.

**Q:** Did you know that Exhibit 60 was not a complete list of all the 1007s for all the peanuts that were put in the dome?

**A:** That's my understanding, that it was not a complete list, right.

**Q:** Okay. In which case, the first date in Exhibit 60 wouldn't necessarily represent the first day peanuts were put in, and the last date in Exhibit 60 wouldn't necessarily represent the last?

**A:** Possibly. I don't know. It depends on when the first one went in there. If you can just show me something --

**Q:** I will.

**A:** -- we can cut to the chase.

**Q:** We will.

**A:** Okay.

**Q:** I'm going to show you what has previously been marked as Exhibit 198, which is Dr. Montross' report.

**A:** Okay. This is 198?

**Q:** Okay.

**A:** Is there a --

**Q:** There's no sticker on it.

**A:** Oh, okay.

**Q:** If you would go to page 40.
**A:** Okay.
**Q:** Exhibit 40 represents the start date, average moisture content, and standard deviation by one-million-pound lot of peanuts that entered the dome.
Do you see that?
**A:** I do.
**Q:** What was the start date for the first lot?
**A:** 9/26/08.
**Q:** And what was the last start date for the -- for a lot?
**A:** It looks like 12/1/08.
**Q:** Okay. So do you accept that Dr. Montross got that right and perhaps you got it wrong?
**A:** It's possible.
**Q:** Okay.
**A:** Yeah.
**Q:** It wouldn't be the first time you've made a mistake, right?
MR. GOLDSTEIN: Objection.
THE WITNESS: I don't have the answer to that. I make typographical errors occasionally.
BY MR. EPSTEIN:
**Q:** You just had a misapprehension of what Exhibit 60 was when you created your timeline, correct?

**A:** I don't know if it was a miss -- I mean, I knew I didn't have them all --

**Q:** Okay.

**A:** -- and I was basing it on that document.

**Q:** Do you not recall R.P. Watson's testimony that the growing season started in September in terms of when they loaded the dome?

**A:** I'd have to review his deposition testimony.

**Q:** All right. Go to page 4. You had made it a point to indicate every time dome temperatures were recorded on page 3, correct? You've got one, two, three, four, five, six, seven, eight, nine, ten entries for dome temperatures recorded on page 3, right?

**A:** On page 3?

**Q:** Go back to page 3.

**A:** Okay.

**Q:** You've got ten different entries for when dome temperatures are recorded, right?

**A:** Yes.

**Q:** And then you've got two more on -- actually, three more on page 4, right?

**A:** Yes.

**Q:** So total of 13 different times you've entered when dome temperatures were recorded, right?

**A:** Yes.

**Q:** Didn't you recall that there were dome temperatures recorded on July 13th, 2009, some three and a half weeks before the application at issue in this case?

**A:** No. I absolutely knew that. It just didn't get in there.

**Q:** That's a big mistake, don't you think?

MR. GOLDSTEIN: Objection.

THE WITNESS: No. It's just an oversight. I mean, I clearly talk about it in my report everywhere else.

BY MR. EPSTEIN:

**Q:** Okay. That should have been included in your timeline because those were the last temperatures known in the peanut pile before there was a fire, correct?

**A:** Yeah, they should have been in there. But again, it's -- it's clear that I talk about the July 13th temperature data that was recorded, and so that's just an oversight.

**Q:** Okay. Go to page 5. The first full paragraph you indicate that the dome was instrumented with 19-cable temperature -- with a 19-cable temperature detection system with a computerized portable reading instrument, right?

**A:** Yes.

**Q:** How much coverage did those 19 temperature cables provide in the dome?

**A:** Well, I mean, if you believe Dr. Montross, around 40 -- 40 percent, 42 percent, but that's misleading.

**Q:** Why is that misleading?

**A:** Because that's not the area. Even he agrees that nothing's going on outside in the far radii of the dome. It's really the stuff from 1 through 13 that you're concerned about. And if you look at that, you're actually talking about 90 percent.

**Q:** 90 percent, you believe?

**A:** Something around there. Doing it the same way that he -- he did his calculation.

**Q:** What were you using for the radius of the temperature sensors in terms of their ability to detect temperatures?

**A:** Well, that would be with a 15-foot detection radius, which is the far end of the limit for what Scott Chant said they were.

**Q:** The far end meaning the greatest?

**A:** Right.

**Q:** Well, if you use the low end of what Mr. Chant said, what would you wind up with?

**A:** I think about 70 percent.

**Q:** Okay. So your testimony is that between 70 and 90 percent of the area in which temperature cables 1 through 13 were located was -- would have been detected by the temperature cables?

**A:** Yeah, something around there. I mean, that's -- that's doing the same method that Dr. Montross used.

[EXHIBIT NO. 264 MARKED FOR IDENTIFICATION]

BY MR. EPSTEIN:

**Q:** Okay. And what is Exhibit 264 that I've just handed you?

**A:** That's basically a demonstration or an exhibit -- an example of what the cable detection would look like at different radiuses of detection.

**Q:** Okay. And tell me what's what.

**A:** The left side is a 12-and-a-half-foot diameter. The right side is a 15-foot diameter.

**Q:** Okay. And what's the second page? Is that the same thing --

**A:** Yeah.

**Q:** -- without the cables listed?

**A:** I think that's correct, yes.

**Q:** Okay. Is there a reason that you have

different colors?
**A:** No. It's just to show the -- the different --
**Q:** The different band of concentric circles?
**A:** Right.
**Q:** Okay. So the first band or the 1 -- cable 1 is red; the second band -- 2, 3, 4, and 5 is yellow and on?
**A:** Yes.
**Q:** Okay. So your testimony is is that between 70 and 90 percent of everything inside the concentric circle of the green sensors, for lack of a better way of describing it, would -- would have been covered?
**A:** Right. Approximately 70 to 90 percent.
**Q:** Which means 10 to 30 percent of the area was not covered?
**A:** That's right.
**Q:** And that means, necessarily, that there could be temperatures higher or lower than the ones recorded by the temperature cables on each of the dates for which we have temperature recording, correct?
**A:** Possible. I think it's unlikely.
**Q:** You think it's unlikely that there's a higher temperature that would have been found in that area of the dome the day IFC fumigated the dome?

**A:** That's right. I think the temperature detection in that area was sufficient to detect what would be the, more or less, highest temperatures in that area.

**Q:** Do you know how many temperature cables Mr. Chant recommended be included in the dome?

**A:** I don't. I know more than 19.

**Q:** Did you know he recommended more than 50?

**A:** I don't know the number off the top of my head.

**Q:** Did you read his testimony?

**A:** I did.

**Q:** Don't you think, in deciding how much of the dome would have been covered by the existing cables, you would wanted to have known what he actually designed for the dome?

**A:** Well, in general. But if you're looking at the spot that's of interest, the reason why you have so much of it not covered is in the outer part of the dome, which is not really the area where you're concerned about. The area that Dr. Montross is concerned about is the area on the inside. And so I think, it that respect, you would have good coverage.

**Q:** So you think Scott Chant would have put another 30-plus cables on the outer edge of the dome?

**A:** I didn't say that.

**Q:** Well, if he recommended more than 30 more cables, don't you believe some of those cables would have been in the area that Dr. Montross is talking about?

**A:** Possibly. But I'm saying it's not important in this analysis.

**Q:** All right. I want to go to page 6 of your report, and I want to start on the section -- and we're going to spend some time on this -- "Self-Heating to Ignition of Peanuts."

**A:** Okay.

**Q:** You have cited there one, two, three, four times, and on the next page, one, two, three times, a publication by J.T. Mills out of Canada, "Spoilage and Heating of Stored Agricultural Products." By virtue of the number of times you cited that authority, did you consider it to be an important authority that brings something to bear on the issues in this case?

**A:** I would say generally, yes.

**Q:** Okay. Okay. So what Mills is saying on the -- on page 11, which you're citing on page 6 of your report --

**A:** On page 11 of his -- okay. Yeah.

**Q:** Page 11 of his publication.

**A:** Sure.

**Q:** And you're citing at the bottom of page 6. What he's saying is that once the biological reaction turns into a chemical reaction at 167 degrees Fahrenheit, self-ignition can occur, correct?

**A:** No.

**Q:** He says, "Chemical heating is caused by oxidation, takes over above 75 degrees Celsius, 167 Fahrenheit, and can continue until ignition occurs," correct?

**A:** Right; but you're making it sound like ignition occurs at 167, which is not correct.

**Q:** Well, he's not saying that once it gets that hot, it's going to then run away to -- to ignition?

**A:** No. Basically you need to have the condition where you reach thermal runaway, and it says it "can" continue until ignition occurs.

**Q:** Let me show you what we're marking as Exhibit 265.

[EXHIBIT NO. 265 MARKED FOR IDENTIFICATION]

BY MR. EPSTEIN:

**Q:** And I would have created the whole thing for you, but as you know, it's a very large document, correct? So I've given you --

**A:** There are several pages, yes.

**Q:** I've given you some excerpts, and if you want, I will let you see the whole thing. But you are citing page 11.

**A:** Uh-huh.

**Q:** And what he says is, "Phase two is known as chemical heating, which occurs from above 75 degrees Celsius to at least 150 degrees Celsius."

**A:** Okay.

**Q:** Right?

**A:** Yes.

**Q:** And he's describing that as the second step that results in self-ignition, correct? He even shows it in his diagram.

**A:** Right. But then he says, "When the biological heating exceeds 75, a purely chemical process may occur and raise the temperature of the material to ignition." It doesn't say it does occur.

**Q:** Understood. But if that chemical process begins, it runs away to ignition, correct?

**A:** Not necessarily.

**Q:** Did you know that in the Mills publication, there's a section on peanuts?

**A:** I do.

**Q:** Okay. In fact, you cited page 80 in your report on page 7.

**A:** Right.
**Q:** Okay. Go to page 80.
**A:** Right.
**Q:** Where he talks about peanut slash ground nut. And would you agree, by "ground nut," he's talking about in-shell peanuts?
**A:** Say that again.
**Q:** Would you agree that when he uses the phrase "ground nut," he's talking about in-shell peanuts, not shelled peanuts?
**A:** I believe that's correct, but let me see here.
**Q:** In fact, he -- he has -- I'll show it to you.
**A:** Yeah. He's got it in there. So just -- if you show me it, then I can --
**Q:** I will show it to you. I'm going to highlight it on mine in the lighter yellow to orient you.
**A:** Lighter?
**Q:** Lighter yellow.
**A:** In-shell -- in shelled -- well, hold on for a second. I think that that's incorrect. In -- if you read that in shelled --
**Q:** Oh, I see what you're saying.
**A:** Yeah.
**Q:** He's referring to -- you're right. He's

referring.
**A:** So that's why I was confused.
**Q:** Okay.
**A:** I think "peanuts" refer to unshelled and ground nuts --
**Q:** Okay.
**A:** -- as I read that.
**Q:** Okay. Okay. So "Storage Problems" on the right-hand side. Do you see that?
**A:** Yes.
**Q:** "Careful harvesting and storage procedures are required to reduce fungal infection by Aspergillus flavus and the development of aflatoxins."
That's talking about peanut -- farmers stock peanuts that are stored, correct? That's what develops or can develop, aspergillus flavus and aflatoxin, correct?
**A:** Yes.
**Q:** All right. So we know we're talking about the same thing that was stored in the Severn peanut dome, correct?
**A:** The same possibly --
**Q:** The same type of nut?
**A:** Right.
**Q:** Okay. And then he goes on to say,

"Self-heating promoted by the presence of damaged nuts and moisture sometimes occurs when peanuts are stored in the large stacks."

Do you see that?

**A:** Right. And then it goes on to say, "It is often detected by an unpleasant smell" --

**Q:** Okay.

**A:** -- "given off by decomposing stacks."

**Q:** I want to take one -- one sentence at a time. What you had in the Severn peanut dome on August 4th, 2009, was a 21-million-pound stack of peanuts, correct?

**A:** Yes.

**Q:** It would be an understatement to say that that was a large stack, correct?

**A:** Well, I mean, it's all relative, right? It's a big stack.

**Q:** It's one of the biggest known to humankind. Wouldn't you agree?

MR. GOLDSTEIN: Objection.

THE WITNESS: I don't know what -- I don't know. It's a big -- it's one of the biggest domes; let's put it that way.

BY MR. EPSTEIN:

**Q:** It's one of the largest storage facilities for peanuts that's ever been built. Would you agree with

that?

MR. GOLDSTEIN: Objection.

THE WITNESS: I have no reason to disagree; let's put it that way.

BY MR. EPSTEIN:

**Q:** All right. And it certainly fits what Mills is talking about when he says "large stack," correct? It fits what he's saying?

**A:** Yes, yes.

**Q:** All right. And I understand what you want to say about unpleasant smells, but that's not my point in asking you questions. You can tell me about that. We'll talk about it. But he says, down about five sentences, "stack temperatures." Do you see that?

**A:** Yeah.

**Q:** "Stack temperatures should be monitored" --

**A:** Yep.

**Q:** -- "at regular intervals."

And then he says, "Once heating has reached 80 degrees Celsius, the temperature will likely continue to increase" until what happens, sir?

**A:** Ignition occurs. But he says "likely." It doesn't mean it will increase until ignition occurs. That's the point I'm making.

**Q:** You're relying in this case on what can

happen to testify as to what did happen, correct?

**A:** Well, no. I know what will -- what -- well, we know that it happens. We know that that process happens. It's not can.

**Q:** Are you saying what -- what Mills says here doesn't give you a sufficient scientific basis to say that if you reach 80 degrees Celsius in a peanut pile as large as what occurred in the Severn peanut dome, you'll reach ignition? You don't have a scientific basis based upon what he says here?

**A:** No. That -- that says it can; it's a likely will, but it doesn't say that it's definitely going to. I mean, yes, you can look at that and say that if you get to 80, that you could get ignition. But you have to look at all the other things to see if it did happen.

**Q:** The Fumitoxin Applicator Manual says that ignition could occur as the result of the piling or stacking of Fumitoxin tablets, correct?

**A:** Right.

**Q:** That is your scientific basis for concluding that ignition did occur, correct?

**A:** Well, that was one of the references I -- I had in my report.

**Q:** This says that at 80 degrees Celsius, self-ignition will likely occur.

**A:** Okay.
**Q:** Correct?
**A:** That's what it says.
**Q:** That's a stronger statement than what appears in the Fumitoxin Applicator's Manual, isn't it?
**A:** That is what it says, but I'm just saying it didn't say it will occur.
**Q:** Any more than the Fumitoxin Applicator's Manual says that if you pile or stack Fumitoxin tablets, ignition will occur, correct?
**A:** Correct. All I'm saying is it says it will occur -- or likely occur; it doesn't say it will occur.
**Q:** And as --
**A:** And you basically -- this whole sentence -- question came about by saying it will occur, I think, in your question. I said that's not necessarily true.
**Q:** But from a reasonable -- reasonable degree of engineering certainty, this statement by Mr. Mills allows you to conclude that, more likely than not, if you hit 80 degrees Fahrenheit in a large stack of farmers stock peanuts -- did I say 80 degrees Fahrenheit? Try again.
What Mills says in the passage we just read -- and I'll read it again: "Once heating has reached 80 degrees Celsius, the temperature will likely continue to increase until ignition occurs" -- gives you,

as an engineer and a fire scientist, a reasonable degree of engineering certainty that if we had that condition occur in the Severn peanut dome, then that is a likely cause of ignition of the peanuts, correct?

**A:** I mean, on face value, you could look at that and say, yes, if it gets to 80, that could occur. You could use that as supporting information, I suppose. But just on face value, if you're looking at everything else, that doesn't necessarily mean it's going to happen.

**Q:** Tell me how -- how looking at this and concluding that this condition will produce ignition is any different than looking at the statement in the applicator's manual that stacking or piling of tablets could cause ignition -- how are those two different where one you can say, yeah, that's going to get me there and the other is not? I'm very confused.

MR. GOLDSTEIN: Objection.

THE WITNESS: You're asking me about one specific part, and all I'm saying is, yes, you could look at that, and under certain circumstances, given the entire investigation, you might be able to use that piece of information. On face value, I would agree with you, but I want to make sure it's not in this particular case.

BY MR. EPSTEIN:

**Q:** Okay. So in this particular case, you would be looking for two things: One, was it likely that you got to 80 degrees Celsius, which is 176 degrees Fahrenheit; and, two, was it self-heating that got you there? Because if you've got those two things, then the inescapable conclusion is a fire was likely to result from that, correct?

MR. GOLDSTEIN: Objection.

THE WITNESS: I guess ask that question again, please.

BY MR. EPSTEIN:

**Q:** Sure. Take this statement at face value.

**A:** Right.

**Q:** And if you then fit around it two facts: One, self-heating within the Severn peanut pile and, two, that you had temperatures that would have gotten to 176 degrees Fahrenheit, then that would at least not allow you to eliminate self-heating as the cause of the fire, correct?

**A:** Well, I don't necessarily agree with that, no.

**Q:** Why is that?

**A:** Because you have to look at the totality of the information; not just, oh, well, let's look at this one statement, which is what you're asking me to do. And

so I disagree with that. Just because you get to 80 degrees doesn't mean you have ignition.

**Q:** So if I told you that I have irrefutable proof that there was self-heating in the center of the Severn peanut pile and that temperatures did in fact, prior to August 11th, 2009, reach 176 degrees Fahrenheit, you would still conclude that you could eliminate self-heating as a cause of this fire?

**A:** If you can look at the temperatures and say you don't have anything that's near ignition temperatures, sure.

**Q:** So the fact that he says, "If you get to 176, you will then get to ignition temperature," doesn't change your mind about that?

**A:** Well, again, it's not you will. You likely will. It didn't say you will.

**Q:** Okay. What you did -- you didn't cite that statement anywhere in your report, did you?

**A:** No.

**Q:** Any particular reason why not?

**A:** No.

**Q:** So in a section deciding whether or not self-heating could have led to ignition of these peanuts, in which you cited J.T. Mills' publication seven times, you didn't think it was worthy of mentioning that he said

that once heating has reached 80 degrees Celsius, the temperature will likely to continue to increase until ignition occurs; is that right?

**A:** Is what right, that I didn't --

**Q:** You didn't think it was worthy of a mention in a section in which you cited J.T. Mills seven times on the section in your report talking about self-heating?

**A:** No. I didn't think I needed to reference that, no.

**Q:** Okay. And did you know, on the very next page in his report, he gave a case study like the case studies you've mentioned on Fumitoxin causing fires, right?

**A:** Right.

**Q:** In which self-heating in the middle of a stack of peanuts led to thermal runaway and ignition, correct?

**A:** Right. Under significantly hot temperatures and in the sun, under a tarp.

**Q:** Be that as it may, he gave an example of peanuts self-combusting, correct?

**A:** Right. And this is like the only one I've actually ever heard about in the research I've done as far as self-heating ignition of peanuts.

**Q:** Did you reference that --

**A:** This is a very -- I mean, this is under extreme conditions in India, under a tarp.

**Q:** Did you reference that case study in your report anywhere?

**A:** No; because it wasn't remotely similar to the case we're dealing with.

**Q:** At the top of page 7 of your report, you cite J.T. Mills for this statement: "Comparatively, shelled peanuts have a very slight tendency to self-heat."

Do you see that?

**A:** Yes.

**Q:** You do realize that this case doesn't involve shelled peanuts?

**A:** That's right. We're talking with in-shell or unshelled peanuts.

**Q:** But that statement was worth mentioning from J.T. Mills?

**A:** Right. You're dealing with peanuts, whether they're shelled or unshelled. We're looking at the ability to self-heat. The ability of unshelled is low anyway. So it's somewhere between low and very low as far as its self-heating ability.

**Q:** You do understand the difference between shelled peanuts and farmers stock peanuts?

MR. GOLDSTEIN: Objection.

THE WITNESS: I do. And you do understand that he's saying that unshelled peanuts have a low tendency to self-heat.

BY MR. EPSTEIN:

**Q:** Right. And Fumitoxin tablets on the surface of a peanut pile, no matter what their configuration, have a low tendency to result in a fire, correct?

**A:** Well, I don't know. I've heard a lot -- about a lot of cases involving application of aluminum phosphide resulting in fires. I've heard of one case with peanuts that have resulted in a fire. And so I think percentage-wise you have a better chance of having a fire with aluminum phosphide -- aluminum phosphide than you do with peanuts.

**Q:** Okay. The very thing that distinguishes farmers stock peanuts from shelled peanuts is what allowed you to make the statement earlier that a flash would still have caused ignition of the farmers stock peanuts, correct? The small materials, the broken shells, the sticks and the twigs, that's what you think was ignited; not the peanuts, correct?

**A:** Well, I think we talked about that.

**Q:** Right.

**A:** We talked about the smoldering of the tablets, and we talked about ignition of the material in

there that then led to ignition of the peanuts.

**Q:** That's why farmers stock peanuts are much more likely to suffer from self-heating than shelled peanuts. Would you agree with that?

MR. WIDIS: Objection.

THE WITNESS: Well, I mean, you have -- you have low versus very low. So both of them are not in a situation where it happens frequently. It's a low tendency to self-heat.

BY MR. EPSTEIN:

**Q:** Yeah. And what J.T. Mills says is going to increase that likelihood is the way in which the food processor has stored the peanuts, correct?

**A:** That can affect it, yes.

**Q:** In fact, he said --

**A:** What page are you on?

**Q:** Back on page 80.

He says, "Self-heating promoted by the presence of damaged nuts and moisture sometimes occurred when peanuts are stored in large stacks."

**A:** Right. Sometimes occurs.

**Q:** But you know that the peanuts that went into the Severn peanut dome, from reading Dr. Montross' report, from reading Dr. Jones' report and on and on, went in with more moisture than they were allowed to

have, correct?

MR. WIDIS: Objection.

THE WITNESS: A few loads went in, correct.

BY MR. EPSTEIN:

**Q:** Hundreds of thousands of pounds.

**A:** I'd have to look at the exact number, but we're talking five loads out of I don't know how many that went in.

**Q:** Are peanuts a good insulator?

**A:** Generally, yeah.

**Q:** So if you put five loads of peanuts that are 3 percent higher in moisture than they should be right in the middle of the peanut pile, does it matter that there are only 5 as opposed to 50?

**A:** I'm not sure where you get the 3 percent. I mean, they went in slightly higher than the 10 and a half percent based on the allowable limit. And so when you're saying 3 percent, where is that coming in?

**Q:** I'm using an example. I'm not even talking about the Severn peanut dome.

**A:** Well, I didn't realize you were giving me --

**Q:** Okay.

**A:** 3 percent?

**Q:** Yeah.

**A:** Likely what?
**Q:** If you put -- if you put in peanuts that were 3 -- well, I will tell you that there's testimony in this case that peanuts in storage should not be any higher than 8 percent.
**A:** Okay.
**Q:** That once you get those peanuts in there, you've got to get them down to 8 percent, and if you don't, you're asking for trouble. And there's all kinds of testimony in this case and all kinds of information in expert reports and in literature saying that.
Assume that's true. We know peanuts went in, hundreds of thousands of pounds, 3 percent approximately higher than that. Are you with me?
**A:** Okay.
**Q:** If those peanuts were concentrated in a certain area in the peanut mass, is it your testimony, well, as long as the average is 8 percent, who cares that there's hundreds of thousands of pounds in 21 million pounds; is that your testimony?
**A:** Well, I think in this particular case, yes. It -- self-heating didn't cause this fire. We have evidence to show that. And so putting in those peanuts really didn't affect things. And you have drying taking place when they're running the fans.

**Q:** Did you do calculations to figure out how much drying you're going to get from running the fans two hours per day?

**A:** I did not.

**Q:** How much drying are you going to get from running the fans two hours a day in the middle of the peanut pile?

**A:** Well, I've looked at R.P. Watson's deposition, and he talks about whenever these things come out -- the first time they came back out way too dry; so he had to cut back on the drying. And then in his experience with that, the peanuts are dryer than they were when they went in, and so you do get drying. Now, Dr. Montross has some calculations, assumptions made in those calculations, but really you have to also look at field experience of guys pulling the peanuts out.

**Q:** Okay. Did you know that same guy pulling the peanuts out testified that the temperatures in the dome never got above 60 degrees as far as he knew before he was shown temperature readings to the contrary?

**A:** You'd have to point that to me.

**Q:** Just because R.P. Watson said it, you believe that that's something you can take to the bank?

**A:** Well, I believe that's a data point you need to look at when you're dealing with the guy who is

looking at his product and whether or not he has to get rid of some of the peanuts because they're molded or have problems. They're not coming out the way he wants them to. I think that's something he would definitely pay attention to.

**Q:** Okay. I'm not sure if you've answered, forgive me, if you have, whether peanuts that go in at a 3 percent moisture content higher than is -- should be in the peanut mass, if those peanuts are wet enough to create the kind of problem that Mr. Mills is talking about here.

**A:** And which problem would that be?

**Q:** The problem of self-heating promoted by the presence of damaged nuts and moisture sometimes occurs when peanuts are stored in large stacks, and I'm talking specifically about the moisture in peanuts that went in at 11 percent.

**A:** Could they?

**Q:** Sure.

**A:** Sure, they could.

**Q:** Okay.

**A:** The question is, how much and does it matter?

**Q:** Okay. And we'll talk about that.

You say on page 7, same paragraph we were just looking at at the top, that "Autoignition of an

organic commodity as a result of thermal runaway typically occurs at 3- to 500 degrees Celsius, 572 to 932 degrees Fahrenheit."

What was your point in making that statement?

**A:** The point is you need to have significantly high temperatures to actually reach the autoignition and start the smoldering process.

**Q:** So you disagree with what Mills says about once heating has reached 80 degrees Celsius, 176 Fahrenheit, the temperature will likely to continue to increase until ignition occurs?

**A:** Well, that's kind of a -- the point is, he's not saying when ignition occurs. He's not saying at 80 degrees ignition occurs. He's saying in that example that if you get to 80 degrees, ignition likely will occur. I'm saying you need to be at that temperature for that ignition to occur. And so it's a long way from 80 degrees C to 300 to 500 degrees C.

**Q:** But if you have self-heating that gets to 176, it doesn't matter what the ignition temperature is. That reaction is going to continue until you get to ignition in all likelihood; not every time, but it usually will, won't it?

**A:** Possibly, yes. If you have the 80 degrees,

you can potentially reach autoignition.

**Q:** Right. What is the container handbook on which you relied for that statement about the autoignition temperature of organic commodity?

**A:** It's a reference I found regarding bulk commodity storage.

**Q:** Is it a published -- is it published?

**A:** What do you mean "published"?

**Q:** Is it something that you can buy on Amazon?

**A:** I think it's online. It's a German -- I think it's a German reference.

**Q:** Okay. Do you know if it's a reliable authority?

**A:** You know, these ignition temperatures are what I would expect. So, I mean, in that respect, I think it's fine. It's not outside the realm.

**Q:** Okay. And the other thing that J.T. Mills says that will get you from self-heating, potentially, to autoignition of the commodity relates to how you store the commodity. And he says, about four or five -- about eight lines down from "Self-heating promoted by the presence of damaged nuts," he says, "The nuts should be kept dry and the maximum amount of ventilation provided to the storage," right?

**A:** Yeah, that's what he says.

**Q:** And we know that's not what happened in the Severn peanut dome, correct?

MR. GOLDSTEIN: Objection.

THE WITNESS: What's not?

BY MR. EPSTEIN:

**Q:** The maximum amount of ventilation provided to the storage?

**A:** Well, they ran their fans up until, I believe, the end of February. And then after that point, they didn't run them, except for a couple hours after the --

**Q:** They sealed it up.

**A:** -- Protect-It. Yeah.

**Q:** So they weren't ventilating that dome but two hours a day until the end of February and then not at all, right?

**A:** Except for the time they added the Protect-It.

**Q:** For two hours?

**A:** Right.

**Q:** So did you know that Dr. Brown in this case has already testified that the storage conditions, both in terms of the moisture and in terms of the aeration, were not appropriate for the Severn peanut dome?

MR. GOLDSTEIN: Objection.

THE WITNESS: I read his deposition. And, I mean, if that's what he said, that's what he said.

BY MR. EPSTEIN:

**Q:** Well, those things will lead to temperature increases of the commodity, correct?

**A:** They can, sure.

**Q:** In this case, we know they did, correct?

**A:** We have temperatures showing certain things. Whether or not those cables are accurate or not is really a huge question in this case.

**Q:** So you're going to doubt the -- what the cables are showing?

**A:** Well, I mean, I think Scott Chant said that -- to use his words, worthless related to the data that was recorded. Things were going on with the cables from the beginning. So we don't know the accuracy or reliability of those particular cables.

**Q:** Mr. Schumacher, Mr. Chant used the word "worthless" for the readings that were taken in prior growing seasons -- isn't that correct? -- that jumped all around?

**A:** He was talking about Exhibit 69, but he said the same thing would apply to Exhibit 70.

**Q:** He did. He said the readings taken on

Exhibit 70 were worthless.

**A:** He said the same concerns he had with Exhibit 69 he had with Exhibit 70. He doesn't know what to make of those particular readings.

**Q:** All right. If you would, go to page 8 in your report.

**A:** Okay.

**Q:** Now, if I understand what you did in terms of Figure 1, you decided that the height of the peanut pile was 20 feet from the ceiling of the peanut dome, and then you created two possible scenarios of an angle of repose of 30 degrees and an angle of repose of 38 degrees to figure out which of the sensors on which cables would have been in the peanut mass.

**A:** Right. I didn't create the dome drawings. John Cavaroc did.

**Q:** Okay. And he used 20 feet as opposed to the 25 feet that R.P. Watson, as the corporate witness for Severn Peanut Company, testified to?

**A:** Yes.

**Q:** Okay. And did you know that R.P. Watson, answering for Severn Peanut Company, said that it was 25 feet, and "Here's" -- "Here's how I came up with that," and he described how he came up with the 25 feet?

Do you recall that?

**A:** You'd have to point it out, but I've seen the number 20 before frequently in the testimony of people who saw it.
**Q:** And the fact of the matter is we'll never know precisely, correct?
**A:** Right. We won't know exactly.
**Q:** And we don't know precisely what the angle of repose is either, correct?
**A:** That's right.
**Q:** Okay. And so you created two possibilities, and if you'll look in Dr. Montross' report, he created a slightly different configuration on page 42.
**A:** Okay.
**Q:** You charted it differently, but the concept that you're both working with is the same between your Figure 1 and his Table 4?
**A:** Same concept, sure.
**Q:** Okay. His X's are showing sensors that are in the pile of peanuts based upon what he described in his report being a -- an angle of repose of 30 degrees and a distance between the ceiling and the top of the peanut pile of 25 feet.
**A:** Okay.
**Q:** Are you with me on that?
**A:** Sure.

**Q:** At somewhere roughly in the vicinity of what you did in Figure 1, correct?

**A:** Right, roughly.

**Q:** Okay. And I want you to keep that page of Dr. Montross' report handy as we work through your report.

You selected four sensors --

**A:** Right.

**Q:** -- to extrapolate the escalation of temperatures that had been occurring prior to the fumigation to August 11th, 2009, correct?

**A:** Yes.

**Q:** All right. You selected, on the second cable, sensors 7 and 8?

**A:** Right.

**Q:** On the sixth cable, sensor 7; and on the 13th cable, sensor 6, correct?

**A:** Yes.

**Q:** Did you realize that not all of those, even by your own Figure 1, were within the peanut pile?

**A:** Yeah. I wanted to be really conservative and look at that situation where you have heating that's in the dome part of the thing and look at that as well.

**Q:** But if you're looking at self-heating and whether it's occurring, it's not going to be occurring at

the head space, is it?

**A:** No, self-heating will not be. But you're going to have heating from the natural heating of the head space of the dome that's going to take place as well.

**Q:** You've got a pocket of biologically degrading peanuts in the center of the peanut pile. How is that going to affect the temperature in the head space?

**A:** I didn't say that was going to affect it. I said you have head space temperature variations from the natural heating up of the dome from one season to the next. That's what I'm talking about.

**Q:** Okay. Who is it that told you that?

**A:** Who is it that told me what?

**Q:** That the dome is going to get hotter as the seasons change?

**A:** Well, there is going to be some heat transfer. Whether or not that's significant or not, you will have some of that heating going on from the sun above it.

**Q:** Really?

**A:** Some of it, yeah.

**Q:** Do you know who David South is?

**A:** Yes.

**Q:** Did you read his report?

**A:** Yes.
**Q:** How many domes has he been involved in constructing over the course of his career?
**A:** I don't know.
**Q:** Thousands?
**A:** I don't know.
**Q:** Does he agree with you that the weather conditions outside the dome are going to affect the temperature on the inside of the dome?
**A:** Well, I don't know if he agrees totally, but there will be some -- some change. Whether it's large or not, he may disagree with that.
**Q:** Okay. You're not an expert on dome technology, are you?
**A:** Not as far as building them, no.
**Q:** Did you understand that there's a significant insulating quality to the monolithic dome of the sort that was built at Severn Peanut Company?
**A:** Right, sure.
**Q:** In fact, that's why Mr. Watson wanted the dome in the first place, isn't it?
**A:** Right.
**Q:** He wanted to keep the peanuts cool, right?
**A:** Right.
**Q:** So you can't just make the assumption, if

it's getting warmer outside, the head space and the peanuts inside are going to get warmer, too, can you?

**A:** Well, I didn't say the peanuts. I'm just saying that the head space will change temperature more than the peanuts based on the seasons changing.

**Q:** Why would the head space be changing?

**A:** Because it's in direct contact with the sun. It's above it where -- and solar radiation and things like that.

**Q:** Are going to be happening through an insulated concrete dome?

**A:** There will be some of that going on. I'm not saying it's significant, but you will have some -- some changes.

**Q:** All right. On page 9, you actually said that the reason you selected those four sensors is because they were, quote, buried in the peanuts and were not in the head space. You realize that's in error, right?

**A:** No. I mean, if you look at -- so you're looking at 6-7? If you look at 6-7 on an angle of repose at 38, it's in the pile. So I guess -- actually, let me look at that. I'm sorry. Give me a second here.

That's right. So it's not -- well, it's not in the pile on either of those. I was looking at the heat -- that was from the heating or the change in

temperature over time. That's why I selected it.

**Q:** You realize that on the bottom figure, the one that's based upon an angle of repose of 38 degrees, three out of the four that you chose were in the head space?

**A:** Let me look at that.

That may be on the bottom, but that's not on the top.

**Q:** I agree.

**A:** Right.

**Q:** On the top, three out of four in the peanuts and one out of four is in the head space.

**A:** That's right.

**Q:** Okay. But your point in picking those was that these four sensors were buried in the peanuts and were not in the head space. That's just not accurate --

**A:** Well --

**Q:** -- is it?

**A:** Other things were basically that it was -- it was -- they were heating the fastest, the greatest temperature change over time. So that's what I was looking at in choosing those.

**Q:** But the number one reason you actually gave in your report was that all four sensors were buried in the peanuts when in fact that's not so?

**A:** That's right. I'm assuming they're buried in the head -- in the peanuts, because they are the ones that are showing the greatest temperature change over time.

**Q:** Okay. I'm with you now. So you're not saying they were, according to your own charts, buried in the peanuts, but you're making the assumption that they would have been?

**A:** Right.

**Q:** Okay. I'm with you.

**A:** Right.

**Q:** All right. Well, what I want to talk a bit with you about is exponential and second order polynomial regressions.

**A:** Okay.

**Q:** Those are the -- that's the expressions you used below your four bullet point items, correct?

**A:** Yes.

**Q:** What's an exponential regression?

**A:** Well, that's the regression involving E to the -- E to the X, basically.

**Q:** E to the X?

**A:** Yeah.

**Q:** Okay. Go ahead on that legal -- piece of legal pad paper, show me an exponential regression.

**A:** Regression or an exponential type of growth based on a regression?

**Q:** I'm looking for you to show a formula or calculation that is what you would describe as exponential regression which was used to fit the data in this case.

**A:** Well, you basically have data points that you then use Excel to apply the best curve fit as an exponential regression to see how the trends are going.

**Q:** Okay. Can you write "exponential regression" on there, and we'll mark that as Exhibit 266.

[EXHIBIT NO. 266 MARKED FOR IDENTIFICATION]

BY MR. EPSTEIN:

**Q:** And as I understand it, you're then using the exponent that you created by looking at those multiple data points to make them fit on the same line to then build the line out further; is that right?

**A:** Yes.

**Q:** Okay. I want you to do the same thing with respect to what you consider second order polynomial regression?

**A:** Well, it's just basically -- the end result is the same thing. You're just looking at how -- it's a different curve fit to those particular points.

**Q:** Okay. And what's different between second order polynomial regression and exponential regression?
**A:** Well, the ultimate curve. I mean, the way it looks, the exponential regression actually gives you higher temp -- or excuse me. The second order of regression gives you higher predicted temperatures than the exponential does.
**Q:** Okay. Why? What is it about using second order polynomial regression that results in higher numbers as you go further down the line?
**A:** That's just the way it ended up with this particular regression using Excel.
**Q:** Okay. Is it Excel that you used, or is it some other program?
**A:** Excel.
**Q:** Okay. All right. So you're not showing me anything differently on a legal paper than you did on Exhibit 266?
**A:** That's right.
**Q:** Okay. Then you can put it aside.
What did you have to -- what part of Excel were you using? What were you telling Excel to do with these numbers?
**A:** You basically plot on a YX graph, and then you say add trend line.

**Q:** Okay.
**A:** And you determine if you want to use an exponential trend line or if you want to use a second order polynomial trend line, and then it gives you that fit in its equation.
**Q:** And it's a purely mathematical equation, correct?
**A:** Right; based on what the data is telling you.
**Q:** And that data is simply numbers as it's used in Excel, correct?
**A:** Right. They're numbers that you're using to predict, based on that trend, future temperatures.
**Q:** And that assumes that what happened before will continue to happen going forward, correct?
**A:** It's showing you what's going on at that time, yeah. It's -- it's charting what's taking place at that time.
**Q:** It's not charting any changes that would take place in the future, correct?
**A:** It's looking at what the trend is at that point, yes.
**Q:** So in other words, if you got to thermal runaway by getting to 80 degrees Celsius and quickly thereafter got to a temperature capable of causing

ignition, the exponential regression and the second order polynomial regression isn't going to show that, is it?

**A:** Again, it's going to show you the trends at that time as to what's going on.

**Q:** It doesn't apply any concepts of agricultural or biosystems engineering to the process, does it?

**A:** Well, those involve exponential growth. So in that sense, it did. And they're very similar to what Dr. Montross got as far as ranges of temperatures in his analysis.

**Q:** You know that he took your analysis and he showed that it didn't come up with the same numbers?

**A:** But I looked at his analysis that he did. He did some regression and said, "Oh, it looks like you can do that." And I looked at his analysis, and the temperatures he got weren't even -- weren't that much different than mine.

**Q:** Okay. Let's look at Exhibit -- at Exhibit No. 198.

**A:** Okay.

**Q:** Page 70 and 71. And I take it you've had a chance to study this now, correct?

**A:** Yes.

**Q:** And so what Dr. Montross did in Figure 27 is he took your exact analysis --

**A:** Which figure are you on again?
**Q:** Figure 27.
**A:** 27.
**Q:** He took your exact analysis and he plotted the actual temperature readings from March, from June, and from July -- and those are the black dots; do you see that? -- which gave him the line that you drew in Exhibit 266 up to the point of the July 13th readings, correct?
**A:** Okay.
**Q:** And he gave a 95 percent prediction band around those. Do you see that?
**A:** Right.
**Q:** From an engineering or scientific point of view, do you agree with applying a prediction band as opposed to a simple linear line?
**A:** Well, I mean, the numbers he actually -- that were measured on August 11th are very close to the predicted model, and so I guess I don't know what your question is. I mean --
**Q:** You're --
**A:** You're looking at, you know --
**Q:** You're --
**A:** -- orders of magnitude here, and still I'm not -- I don't get it.

**Q:** You came out with a temperature barely of 100 degrees.

**A:** It's 105, I think, and I think the actual -- what is this temperature showing?

**Q:** The black line is showing 120. The red line is showing, on top, 160. And the red line on the bottom is showing about 110.

**A:** And I need to look at what that -- the one that's about 170, that very likely could be on the surface. And that's why it's at that high temperature. And I think that's -- what number is that one there?

**Q:** I'm sorry. What number is what one?

**A:** The high one, the one that's higher. I guess I don't understand the question you're asking.

**Q:** You're --

**A:** I'm not concerned with this analysis because it's close and it gives you orders of magnitude, which is what I'm looking at.

**Q:** Why did you get a different number then than he did by applying the exact same analysis?

**A:** Well, he's got -- I don't know how. He's got several different points at each date, when I only did one. I didn't do several; I did one thermocouple per regression. He's doing several together and doing a regression off those several.

**Q:** You had four different sensors.

**A:** I did individual regressions on those -- on each sensor, not coupled together.

**Q:** Okay. You took sixth grade math, didn't you?

**A:** I did.

**Q:** Did your sixth grade math teacher make you show your work in order to get credit?

**A:** Sure.

**Q:** Where is the work that you did that supports the 125 degree Fahrenheit, 105 degree Fahrenheit temperatures that you came up with on page 9 of your report?

**A:** It's in the material that I provided, that should have been provided to you.

**Q:** All right.

**A:** While you're looking at that, can we --

**Q:** Absolutely.

**A:** -- take a quick break?

THE VIDEOGRAPHER: Off the record at 3:19.

[RECESS TAKEN]

THE VIDEOGRAPHER: On the record at 3:31.

BY MR. EPSTEIN:

**Q:** All right. Now, off the record, Mr. Schumacher, I was having you try and help me understand on the disk of material that you provided which you were referring to as what showed your work for the analyses that we have just been talking about, and you have said it is a file that says "Temperature Readings" -- an Excel file that says "Temperature Readings, Exhibits" -- I'll open it up -- "Exhibits 69 to 70." Is that the Excel file that you used to come up with the numbers that are included in your report?

**A:** Yes.

**Q:** Okay. And just to make sure I complete my thought, there's also a -- one that says "Temperature Readings 8/11/09." Did that go into your analysis at all of -- on page 9 of your report of exponential and second order polynomial regressions?

**A:** No, that one did not.

**Q:** Okay. So all of the data that are in your report are also in the Excel file "Temperature Readings, Exhibits 69 to 70," correct?

**A:** Your question is all the data in my --

**Q:** All of the data included in the paragraph beginning "Exponential and second order polynomial regressions were used to fit the data" -- all of the data that we see in that paragraph, 105 degrees Fahrenheit,

125 degrees Fahrenheit, 89 degrees Fahrenheit, and 115 degrees Fahrenheit, can be -- how you got there is contained in the Excel file titled "Temperature Reading, Exhibits" -- "Temperature Readings, Exhibits 69-70 Excel SX"?

**A:** Yes.

**Q:** Okay. All right. And while we're talking about your file material, I placed before you -- or at least I thought I'd placed before you.

**A:** I haven't -- I haven't lost them.

[EXHIBIT NOS. 267 THROUGH 273 MARKED FOR IDENTIFICATION]

BY MR. EPSTEIN:

**Q:** I am placing before you Exhibits 267 through 273, and I wanted to go through those with you very quickly, just having you identify what each is and why you prepared it, starting with 267.

**A:** Those are just temperature profiles similar to what Dr. Montross did with his movies for various temperature readings.

**Q:** Okay. And this is just -- this is just to show the actual temperatures recorded by the Severn temperature monitoring equipment as opposed to any increases in temperatures, correct?

**A:** Right. They're showing what is being

recorded by Severn.

**Q:** Okay. The actual temperatures with colors as depicted in the color temperature chart on the right-hand margin?

**A:** Right. The temperatures that were recorded, yeah.

**Q:** Okay. What is 268?

**A:** That's just showing the dome, the pile of peanuts as -- let me look at this first before I speak.

This is a dome, I think, or a pile of peanuts showing dimensions in where thermocouple sensors were located or cables were located.

**Q:** Okay. So that's not trying to show the peanut pile?

**A:** And I'm trying -- I think it is. I think we're trying to show the volume of the peanuts at, you know, different configurations here. So it's calculating those peanut volumes.

**Q:** Okay. Go to 269. What is that -- what is that and what is it attempting to show?

**A:** That's showing, again, that you're sensing percentages at different configurations.

**Q:** Okay. And at 12.5 feet, you're at 68.4 percent of what's in the 1-through-13 space, and at 15 feet, you're at 92.1 percent of what's in the 1-to-13

space?

**A:** Yes.

**Q:** Okay. 270; what is that?

**A:** I think these are just the various -- what are those, 1007s?

**Q:** 1007s, uh-huh.

**A:** 1007s. Probably from Exhibit 60.

**Q:** Okay.

**A:** I just was putting it in there and --

**Q:** Did you use this information in any particular way?

**A:** No.

**Q:** Okay. Exhibit 271.

**A:** That is just quick calculation of the height of the peanuts at the chute, I think. Done early on.

**Q:** Okay.

**A:** It had no bases necessarily to my conclusions.

**Q:** Okay. 272.

**A:** This is -- I read something in Dr. Montross' report where he cited something that was clearly wrong, and I was showing that you're not going to get this huge BTU generation from the dry metal loss model as carbohydrate oxidation that he reported in his report.

**Q:** Can you find specifically what in his

report -- you've got it in front of you -- you're talking about?

**A:** Right. And I will do that. Give me one second.

**Q:** Yes. I know you've got a lot of paper in front of you.

**A:** Got to organize it here.

So it's equation 7.

**Q:** You think his equation 7 is wrong?

**A:** Let me -- let me step back. It's -- where he says every gram -- sorry. So it would be underneath equation 7, second sentence. Every gram of dry metal loss would produce 1.47 grams of CO2, .6 grams of water, and 677.2 -- or 670 -- let me just start again -- 6,772 BTUs of heat. And in actuality, it's only 15 BTUs of heat.

**Q:** And that's what you show in Exhibit 272?

**A:** Yeah.

**Q:** Okay. 273; what is that?

**A:** I got the -- okay. That was just looking at the water available on the Protect-It versus in the peanuts and in the air.

**Q:** What were you using that to determine?

**A:** Just looking at the effect that Protect-It would have potentially had.

**Q:** In terms of whether it would have created sufficient moisture to have a reaction with the Fumitoxin tablets?
**A:** Right. Whether or not it was a big contributor, and I don't think it had anything to do with it.
**Q:** Okay.
**A:** Is that the last one?
**Q:** That is.
**A:** You want these back or --
**Q:** The court reporter would want them.
So I want to go back to Dr. Montross' report where we were, which is on Figure 27. And you understand that Dr. Montross believes that the hot spot was located primarily in a different area than the sensors that you used for your two regression analyses, correct?
**A:** I think some of them, yeah, I would agree.
**Q:** Okay. I think you have one in common, which was sensor -- well, let's go to Dr. Montross' report on page -- we were there a minute ago.
**A:** You want --
**Q:** Page 42.
**A:** 42? Okay.
**Q:** Yeah.
**A:** I've got it.

**Q:** Okay. On page 42, he marked in red X's the sensors that he believed were in the hot spot resulting from self-heating, correct?
**A:** Yes.
**Q:** Okay. And that would be sensor -- or cable 2, sensor 7; cable 3, sensor 6 and 7; cable 4, sensor 6 and 7; cable 5, sensor 6 and 7; and cable 6, sensor 6, correct?
**A:** Yes.
**Q:** And of those, the only one that you had in common was cable 2, sensor 7, correct?
**A:** Let me -- let me take a look and --
**Q:** It's on page 8 of your report.
**A:** Thank you.
That's correct.
**Q:** Okay. So what he did in Figure 28, if you move to Figure 28, which is on page 71 --
**A:** Figure 28?
**Q:** Uh-huh.
**A:** Okay.
**Q:** -- is he went ahead and did the exact same regression analysis that you did to come up with your temperatures, and his analysis showed that the temperatures measured, on August 11th, five out of six -- one, two, three, four -- one, two, three, four, five --

five out of six that there were temperature data available for wound up right in that 95 percent prediction zone, correct?

**A:** Okay.

**Q:** So do you understand that what Dr. Montross shows through regression analysis is that you actually do get to most of the temperatures that were detected on August 11th when the fire was discovered just by a straight linear regression analysis?

Do you see the red triangles within the 95 percent prediction zone?

**A:** Sure. I don't know how that's a linear regression.

**Q:** Okay. You think he did a different regression analysis than you did?

**A:** You're saying he did a linear. That looks -- doesn't look like a linear regression.

**Q:** I'm not -- I'm talking about the same -- he took the same data and he used a straight mathematical equation like you did, which is equation 18.

Did you see his equation 18?

**A:** Yeah, I did. Sure.

**Q:** Do you object to his equation 18?

**A:** No, I think it's fine.

**Q:** Using that equation, he wound up getting the

August 11th temperatures from the temperatures that were recorded in March -- in March, in June, and July?

**A:** Okay.

**Q:** So he is saying that you actually do get to the August 11 temperatures as the result of regression analysis; whereas, you are saying in your report, unless I'm missing something, that you don't?

**A:** No. I'm saying that you don't get to temperatures that are remotely close to ignition temperature, and so if there -- if these temperatures are accurate and there is some heating, it's inconsequential to me.

**Q:** Show you what's been marked as Exhibit 196.

**A:** Okay.

**Q:** Mr. Schumacher, there's not a single temperature in Exhibit 196 that would be, quote, an ignition temperature, is there?

**A:** That's right. And we don't know what's going on with the 230's, but that's -- you know, that's -- could be bad cable or anything. But you're right. That's why you've got to wonder about these thermocouples.

**Q:** These thermocouples don't go beyond 230. Didn't you read Mr. Chant's testimony?

**A:** That's right. My point is, we don't know

what's going on with, for instance, thermocouple -- or cable 13 or 3 or 1. They can just be bad. You could have a fire on the surface. You could have a fire somewhere else. We don't know. But the point is, if you look at all the other data, there's nothing that shows ignition temperatures in this stuff.

**Q:** But there are significantly elevated temperatures as you would expect there to be knowing that there was a fire inside of the dome, correct?

**A:** Well, you're assuming that these temperatures are accurate, one; which, again, that's very questionable. And there are temperatures -- so if you assume that they're accurate, there are some temperatures that are higher, yes, but they're not at ignition temperature.

**Q:** Because you don't have 100 percent coverage in the dome and because the temperature cables can't tolerate temperatures higher than 230 degrees.

**A:** That's right, but they don't show anything here that says that there is ignition because of self-heating to ignition.

**Q:** Okay.

**A:** And that's what Dr. Montross showed, too.

**Q:** Okay. Well, if you had a self-heating process and you got to temperatures of 176 degrees

Fahrenheit, then somewhere within that material, you're going to get thermal runaway --

**A:** And --

**Q:** -- in all likelihood, according to J.T. Mills, correct?

**A:** Right. And we don't see that in these -- assuming these are accurate, we don't see that.

**Q:** You see temperatures in excess of 176, don't you?

**A:** But we don't see ignition temperatures. That's my point. There is no evidence of any ignition temperatures in this data.

**Q:** Well, you didn't have to do any regression analysis to state that in your report, did you?

**A:** Sure. You have to look at what you think's going to happen and you look at what the temperatures are showing you and you look at the reliability of the data and you determine, well, was this data accurate or not? Is it reliable or not? If you can't look at the temperatures and believe they're correct, then you have to look at other things that may or may not tell you if you have heating going on. And that's exactly what Dr. Montross showed, that you're not going to get there from here. You can't get to the ignition temperature. He proved that.

**Q:** Okay. You think Dr. Montross proved that you can't get ignition of the peanuts by virtue of the temperature modeling he did in his report?

**A:** That's what his self-heating modeling is showing to me.

**Q:** Okay. Do you agree or disagree that there is nothing about the August 11th temperature readings that supports the notion that the fire began on the surface of the peanuts?

**A:** Well, again, we don't know about the reliability of the temperature data. And so you can't say either way what these temperatures are showing you.

**Q:** Well, let me ask specifically again. Would you agree that there is nothing in the temperature data from August 11th, 2009, the first page of Exhibit 196, which would support the notion that the fire commenced on the surface of the peanut pile?

**A:** Well, I mean, again, you have those thermocouples that we don't know what's going on with those. And those could actually be bad because you have a fire on the surface, but we don't know.

**Q:** So the answer is, yes, there's nothing here that supports the notion that the fire occurred on the surface of the peanut pile?

**A:** And there's nothing that supports the notion

that it occurred in the peanut pile.

**Q:** Okay. I'm with you on that; however, the hottest temperatures recorded on this page of Exhibit 196, August 11th, 2009, were deep within the peanut mass, correct? The ones that recorded actual temperatures as opposed to 230, the very hottest temperatures were in the interior of the peanut pile?

**A:** Well, just taking these on face value, that is correct, assuming that there's any reliability to these readings.

**Q:** Okay. We're back on page 9 of your report. For the time being, I'm done with Dr. Montross. We will come back to it.

**A:** Let me get this -- let me get this organized here.

**Q:** Sure. You can hand me back that exhibit to get it out of your way.

**A:** This one?

**Q:** Yeah.

**A:** Okay. What page?

**Q:** You're on page 9 of your report.

**A:** Okay.

**Q:** You begin your next-to-last paragraph on the self-heating section by saying that "Randall Turner and Brian Lilley did not notice anything with the dome or

peanuts prior to fumigating on August 4th, 2009, that concerned them. An unpleasant odor associated with mold growth likely would have been noticed by the IFC fumigators had self-heating of any significance been occurring at that time."

**A:** Correct.

**Q:** Mr. Schumacher, how heavily do you rely on the fact that, as you say, the applicators did not smell any odors associated with mold on August 4th for your conclusion that self-heating can be eliminated as a cause of the fire?

**A:** Well, it's one point that I'm considering. And, you know, several people said that they would have smelled it if there had been any self-heating of significance taking place on August 4th. People like Scott Chant. R.P. Watson I think said it. Even Mills talks about it in the -- that publication, and that's typically how these things are discovered as far as when you have a mold problem is through smell.

**Q:** Did you read Dr. Brown's testimony?

**A:** I did.

**Q:** Did you see that Dr. Brown had a different take on that?

**A:** Well, you can point to that section.

**Q:** I can if I find it.

Let me ask you generally what I asked him. Do peanuts have an insulating effect?

**A:** They do, yeah, but they also have a lot of porosity and a lot of ability to allow the air to move through them.

**Q:** Okay. And if there is mold 60 feet down in a peanut pile, do you believe that 25 feet above the peanut pile it's necessarily something that somebody's going to smell?

**A:** Well, I think with the size of the peanuts that is being modeled as far as molding and self-heating, I think you would have smelled it, particularly where the hot spots are, where he's modeling those. So, yes, I would think you would smell that.

[EXHIBIT NO. 274 MARKED FOR IDENTIFICATION]

BY MR. EPSTEIN:

**Q:** Show you what's being marked as Exhibit 274.

**A:** Okay.

**Q:** Okay. This is from the deposition of Dr. Brown.

**A:** Okay.

**Q:** At the very bottom of page 131, he was asked, "What causes self-heating in a stored commodity?"

He said, "Well, there's two different things.

One could be a microbial activity that is the result of poor storage conditions, high moisture, high temperature resulting in an explosion of microbial activity. And those microbe" --

**A:** I'm sorry. Where are you?

**Q:** Bottom of page 131.

"What causes self-heating in a stored commodity?" Do you see that?

**A:** Oh, then you went to the next page.

**Q:** Yes.

**A:** I was looking for it on that page. Sorry.

**Q:** And he said, "Well, there's two different things. One could be microbial activity that is the result of poor storage conditions, high moisture, high temperature resulting in an explosion of microbial activity. And those microbes are all generating heat so that, in those particular cases, you can get very high temperatures."

At the bottom on line 23, I asked, "Whereas the microbial growth would, in fact, cause heat within peanuts?"

He said, "Under the right conditions, it could, yes."

I asked, "Okay. Well, let's assume" -- 133 -- "that happened under the right conditions, okay?

Can you think of any reasons why that type of process, presumably occurring somewhere in the middle of a 21-million-pound mass of peanuts, would be detectable by a smell some 20 to 25 feet above the peanut mass?"

Okay. He gave a long answer. And then I asked him, on line 16, "Okay. And so my question is, if that phenomena is occurring right smack dab in the middle of that massive pile, will there be an insulating effect from the peanuts above that mass of biological degradation which, for at least a period of time, will suppress the smell from reaching the head space?"

Answer: "That's reasonable to conclude. I can't say with any certainty how long it would take, but, yes, there would be some insulating effect, I would assume."

**A:** Okay.

**Q:** He knows a lot more about peanuts than you do. Would you agree with that?

**A:** I would say he knows more about peanuts, sure. But as far as self-heating and things like that, no.

**Q:** Okay. So what R.P. Watson says about smells is more important that what Dr. Steve Brown says about it?

MR. GOLDSTEIN: Objection.

THE WITNESS: Well, I mean, the way he phrased it, deep in the pile versus near the surface where the hot spot is being modeled by Dr. Montross, I think in that situation you would smell it.

BY MR. EPSTEIN:

**Q:** Okay. Where in NFPA 921 does it state that the cause of a fire or a potential cause of a fire can be eliminated based upon what was smelled or not smelled prior to the discovery of the fire?

**A:** Well, I don't know if that language is in there, but that -- you use the information that is available to you in trying to determine what can be eliminated and what cannot. And so, certainly, that's a part of what we look at when we're investigating these fires are observations like that.

**Q:** And your conclusion is that what Dr. Montross labels is the hot spot is close enough to the surface of the peanut pile that if Randy Turner and Brian Lilley didn't smell a rancid odor on August 4th, 2009, then there wasn't a biological heating process that could have resulted in the combustion of these peanuts?

**A:** At that point, yeah.

**Q:** Have you done any research or testing about the smells that are produced by a 21-million-pound mass of peanuts?

**A:** No. Just read what's in Mills and what people in and around peanuts like R.P. Watson say and Scott Chant.

**Q:** Okay. And Mills didn't talk about a 21-million-pound of peanuts -- peanut -- 21-million-pound mass of peanuts where biological heating is occurring beneath the surface, did he?

**A:** I don't think he was that specific, no.

**Q:** And you intend to tell the jury in this case that you concluded that self-heating is not a possible cause of this fire based upon what Mr. Turner and Mr. Lilley did not smell on August 4th, 2009?

**A:** That's one of the things I'm relying on, yes.

**Q:** Would you agree with me that under NFP 921 -- NFPA 921, that if you do not have a scientifically valid basis to eliminate self-heating as a cause of the Severn dome fire, you cannot come to a scientifically valid conclusion that something else caused the fire?

**A:** Are you saying if I can't eliminate one particular cause scientifically, then I can't reach a conclusion as to the cause of the fire?

**Q:** That you can't reach a conclusion that something else caused the fire; that's my question to you.

**A:** Right. You have to eliminate things before you can move on to the next --

**Q:** Okay. So let me ask --

**A:** -- potential cause.

**Q:** Let me ask it again. I think we're seeing eye to eye on this. You would agree with me that under NFPA 921, if you do not have a scientifically valid basis to eliminate self-heating as a cause of the Severn dome fire, in that event you could not come to a scientifically valid conclusion that something else caused the fire, correct?

**A:** Correct. If I can't eliminate self-heating, then I can't reach a conclusion.

**Q:** I understand you did eliminate self --

**A:** Hypothetically.

**Q:** I understand you did eliminate self-heating, but you agree with the general concept?

**A:** Yes.

**Q:** Okay. And the last thing you say as to why you eliminated self-heating is, "Additionally, peanut temperatures as recorded by IFC on August 4th, 2009, were 24 C, 75 Fahrenheit. Therefore, self-heating to ignition of the peanuts can be eliminated as potential cause" -- "potential fire cause in the dome at Severn."

So you're relying on the temperature

measurement recorded by the IFC applicators; is that correct?

**A:** Right. It's a piece of information I can use that I'm told is accurate.

**Q:** Who told you it was accurate?

**A:** Well, no one told me specifically, but the 30(b)(6) witness said that it's reliable for IFC.

**Q:** What 30(b)(6) witness?

**A:** Don't know if it's Henry or -- I mean, one of the 30(b)(6) witnesses that I read.

**Q:** Show you what's been marked as Exhibit 23 previously. Is that what you're referring to?

**A:** What I'm referring to regarding the --

**Q:** Commodity temperature.

**A:** Yes.

**Q:** So it's the commodity temperature 75 degrees in Exhibit 23 that is one of the bases upon which you conclude that self-heating can be eliminated as a potential cause of the fire, correct?

**A:** Right. That's one piece of information that I --

**Q:** Along with the smell?

**A:** Along with the smell and the other stuff that I've done.

**Q:** Okay. Show you what's been previously marked

as Exhibit 199, which is a portion of the deposition testimony of Randall Turner.

**A:** Correct.

**Q:** Okay. Did you read this?

**A:** His deposition?

**Q:** Yes.

**A:** Yes.

**Q:** All right. He was asked, line 7, "Did you check the temperature inside the dome prior to doing the August 4th, 2009, fumigation?"

Answer: "I didn't check it myself."

Question: "All right. Where did you get the number that's on your service report?"

Answer: "R.P. Watson gave it to me" -- "provided it for me."

Question: "But you didn't check any temperature yourself?"

Answer: "No."

Did you know that Mr. Turner did not check any temperature that was recorded on his service report?

**A:** Well, that's what he's saying. But again, I've been told that that's a reliable number by the 30(b)(6) witness.

**Q:** You have?

**A:** In the deposition, yes.

**Q:** Okay. So despite the fact that the person who wrote that number on the service report says, "I didn't measure that temperature. I got it from R.P. Watson" -- do you know what R.P. Watson said about that, by the way?

**A:** Yeah. I think he said that he didn't give it to him.

**Q:** Okay.

**A:** So it came from somebody. Somebody checked it. Somebody -- he got that information somewhere. Certainly he wouldn't pencil-whip that report.

**Q:** That's not what you draw the conclusion of having read the testimony of Randy Turner, who said, "I got it from R.P. Watson," and R.P. Watson's saying, "I didn't provide it to him"?

**A:** They don't remember how it got there, but it -- there's a temperature on there showing 75 of the commodity.

**Q:** Randy Turner didn't have any temperature monitoring equipment with him. Did you know that?

**A:** I did know that.

**Q:** So how could you rely on a temperature that he wrote down if he didn't have any temperature monitoring equipment to measure it?

**A:** Well, the number, 75 degrees, is written on

the commodity temperature. And so that's, to me, what the commodity temperature was when they went to fumigate.

**Q:** The reality, sir, is that there would have been a myriad of temperatures in that peanut mass, not one, correct?

**A:** Well, possibly.

**Q:** Possibly? Every -- every spreadsheet that you've seen from the temperature monitoring cables has a myriad of temperatures, correct?

**A:** There are differences, correct.

**Q:** There wasn't going to be one temperature coming from a 21-million-pound mass of peanuts, was there?

**A:** Probably not, but 75 is the number that I see indicated was the temperature of the commodity on August 4th.

**Q:** So even if the temperature was 150, you're relying on 75, right?

**A:** Well, that's the number that they recorded, and it wasn't 150.

**Q:** The reality is we know that a few days later there were temperatures over 200 degrees, don't we?

**A:** We don't know the accuracy of those temperatures. That's the problem. You have a fire situation taking place. These thermocouple cables are

not meant to be in a fire environment.

**Q:** We know, three and a half weeks before, there were temperatures that exceeded 90 degrees, correct?

**A:** Well, I think you had one temperature of 91.

**Q:** Okay.

**A:** One temperature of 191 [sic] I think is what you were --

**Q:** And multiple temperatures in excess of 85, correct?

**A:** Well, I don't know how many in excess of 85, but you had some, sure. But that's --

**Q:** So we know that there were temperatures that were going to be in excess of 85 degrees on August 4th, 2009; true or false?

**A:** Well, that's assuming again that those are accurate reads.

**Q:** So the temperature that you're assuming is accurate is the one that was recorded without any temperature monitoring equipment at all, and the temperatures that you're questioning are the ones that were recorded by temperature monitoring equipment, right?

**A:** I'm questioning the reliability of the temperature cables because it's been said by Scott Chant that they're worthless. Some -- 75 degrees has been

written down as a commodity temperature. 30(b)(6) witness says you can rely on that as an accurate number, even though he doesn't remember -- he said, "I asked it of R.P. Watson." R.P. Watson said, "I didn't give it to him." Somehow that number was there, and it's considered an accurate number.

**Q:** Sir, if the temperature monitoring equipment was working properly on July 13th, 2009, there were temperatures in that peanut dome at least 10 degrees in excess of 75 degrees on August 4th, 2009, correct?

**A:** In parts of the dome, sure, if they're accurate.

**Q:** So if I understand you correctly, you're eliminating self-heating as a potential cause of the fire because you don't see any temperatures that are over 500 degrees Fahrenheit, number one; because, number two, Randy Turner and Brian Lilley didn't smell a stench when they were on top of the dome on August 4th, 2009; and, number three, because the actual temperature recorded on their fumigation report for the commodity temperature on that day was 75 degrees. Is that about it?

**A:** No. I've done some analysis on what I think the temperatures would be, and they're not close to ignition. We're not seeing temperatures in the dome on August 11th, after a fire has been discovered, that

indicate ignition temperatures anywhere in the dome.

**Q:** But you had to have reached ignition temperatures as of August 11th by definition, correct?

**A:** Right. And we're not showing that, and so you've got question the reliability of the temperature data itself.

**Q:** Go back to Exhibit 196.

**A:** I think you took it back.

**Q:** I did; you're right. It would be fair of me to give it back to you.

Exhibit 196 shows temperatures that very likely could have existed in the Severn peanut dome on August 11th, 2009, at 9:00 p.m., if there was a fire somewhere within that peanut mass.

Would you disagree with that?

**A:** What is your question?

**Q:** Let me ask it a different way. Just because you reach the ignition temperature of peanuts somewhere within the 21-million-pound mass of peanuts doesn't mean you're going to have ignition temperatures throughout the mass of peanuts, does it?

**A:** You should -- right; but you should see evidence of ignition temperatures somewhere, which we don't see.

**Q:** Unless you have cables that were compromised

because you reached ignition temperatures around those cables, correct?

**A:** Or because you have ignition of a fire on the surface and they've compromised those cables. And so then you have bad cable readings. So what I'm saying is, you can't look at this data and rely on it to say one way or the other what's going on.

**Q:** Why can't you look at cable 11 and see temperatures of 200, 197, 201, 208, which are within the capability of that cable to measure temperatures and say those were the temperatures in those locations of cable 11?

**A:** And then you see on cable 11 a sensor 12 of 157, which is not present. You see no reading in sensor 11 for cable 11. And so you have readings in here that make no sense, which makes me want to question what's going on with all of these readings. You've got -- you've got several of them that don't even exist. So when somebody is taking this down, where are they getting those numbers? How is that generating any temperature data whatsoever?

**Q:** Okay. So even though the people who recorded these data said they knew what they were doing and they thought these were accurate data, you're saying, no, they weren't?

MR. WIDIS: Objection.
THE WITNESS: I'm questioning them as well as Scott Chant. He's the guy who designed these things. He says all this stuff is basically worthless.
BY MR. EPSTEIN:
**Q:** Scott Chant said that the August 11th, 2009, temperature data was worthless?
**A:** Exhibit 70 he was referring to, which includes this.
**Q:** Okay. That's your perception of what Scott Chant said about Exhibit 70?
**A:** He said Exhibit 69 was worthless, and he said, with Exhibit 70, he has the same concerns as he has with Exhibit 69.
**Q:** Okay. You didn't review and credit the testimony from Mr. Chant which said, "I find that the temperatures in Exhibit 70 basically make sense and I would rely on them" -- you don't find that to be worthy of crediting?
**A:** No. He was all over the place, but he did say that he had questions and couldn't -- didn't know what to make of these temperatures in Exhibit 70.
**Q:** Okay. What's the point of origin of this fire, Mr. Schumacher?
**A:** The point of origin of the fire?

**Q:** Yes.
**A:** Well, I believe the fire started on the surface.
**Q:** That's not a point of origin, is it?
**A:** Well, I mean, that's as best you're going to get as far as area. It's more of an area, but it's on the surface of the peanut pile.
**Q:** Do you know that there are 66,000 square feet to that surface?
**A:** Right.
**Q:** You think it's acceptable for an origin and cause determination to say, well, somewhere within those 66,000 feet?
**A:** Well, I think that's an exaggeration as far as 66,000. It's somewhere within the area underneath the dome where they're accumulating these piles of tablets. And so 66,000 is really not an accurate representation of what you're dealing with here. You're dealing with a much more limited area. And as far as the point of origin, I can't tell you exactly on that surface where it occurred, but I can tell you it occurred inside the dome.
**Q:** Inside a 2-million-cubic-foot dome, somewhere in there?
**A:** Right. It's likely directly below or

somewhere off to the side of that area right below the -- the area where they applied the tablets.

**Q:** How can you determine the cause of a fire within a 21-million-pound mass of peanuts if you don't know where the fire began?

**A:** Well, I do know where the fire began, on the surface. Can I pinpoint exactly where on the surface? No, I can't.

**Q:** How many times in your career have you reached the origin and cause determination of a fire without being able to establish the point of origin?

**A:** Well, I mean, the point of origin is more specific than the area of origin, but you can establish a fire based on the area of origin. So that's the surface of the peanut pile. I can't tell you exactly where on the surface it occurred.

MR. EPSTEIN: Could you read him back the question.

[RECORD READ]

THE WITNESS: I have concluded -- or determined the cause based on an area of origin and -- where I have not been able to say the point. It's happened in the past. I can't tell you how many times.

BY MR. EPSTEIN:

**Q:** Very few. Would you agree with that?

**A:** Well, I mean, I can't -- I mean, I've done a lot of fires, and so I can't tell you how many times that's occurred.

**Q:** It's not what you would prefer in determining the cause of a fire; you would prefer to determine the point of origin of the fire, correct?

**A:** Sure, if you could do that, but it's not necessary, particularly in this case.

**Q:** You agree with me that there is no evidence whatsoever that the fire began on the surface of the peanut pile?

MR. WIDIS: Objection.

THE WITNESS: Well, there's evidence of the manner in which Fumitoxin tablets were applied and all those reasons why that would lead to piling and ignition. As far as physical evidence -- well, I don't know of any physical evidence that supports one way or the other in this case because no one got into the dome.

BY MR. EPSTEIN:

**Q:** Well, in terms of photograph, video, infrared technology, in terms of any temperatures ever recorded anywhere, any data of any kind, there is not a shred of that kind of evidence that in any way establishes that this fire commenced on the surface of the peanut pile;

isn't that correct?

**A:** Well, I think there were some temperature data taken after the fire had been going showing that you had high temperatures in the head space. But as far as temperature data on August 11th, there's nothing that establishes that there is a fire inside the peanut pile. And again, there's no physical evidence that you can point to to suggest that the fire started inside the peanut pile.

**Q:** I know you want to reverse the question I'm asking, but I'm going to ask my question, which is, there is no evidence that you can point to, whether it is photographic or data, that in any way suggests that the fire commenced on the surface of the peanut pile, correct?

**A:** Well, there -- I mean, there's evidence based on the whole process of eliminating causes, and when you eliminate self-heating, then you look towards the other cause. And in -- through that process, you evaluate that cause related to the evidence that is there, and it's supportive of piling the Fumitoxin tablets on the surface.

**Q:** Okay. For an investigator who showed up on August 11th, 2009, to determine the origin and cause of this fire, were there any data available or images

available or that could have been created which would have established that the fire commenced on the surface of the peanut pile?

**A:** Was there -- were there any pictures taken? No, I don't think they -- they took one on August 27th, I think, a thermal image, you know, several weeks later showing the fire on the surface.

**Q:** And the only other available data would have been temperatures, correct?

**A:** That's right.

**Q:** And none of those temperatures establish in any form or fashion that the fire commenced on the surface of the peanut pile, correct?

**A:** Well, they -- again, they're showing high temperatures in the head space a couple days after, which I think is the first time they took readings, like significantly high temperatures. Maybe actually it was a -- of the metal surface. So you have high temperatures in the head space.

**Q:** Would you agree with me that high temperatures in the head space on August 13th, 2009, do not establish where the point of origin of that fire was?

**A:** That's right. They don't tell you if it's in the peanut pile or if it's on the surface.

**Q:** And if, just by chance, the temperatures recorded throughout Exhibit 136 -- you realize that they -- Lester Rich was there when they were taking these temperatures a few times a day on the Severn temperature monitoring system? You know that, right?

**A:** Okay.

**Q:** Do you think he was doing that just for the heck of it?

MR. GOLDSTEIN: Objection.

THE WITNESS: I don't know. He probably had a reason for doing it, but then you have to sit back and look at it after you've taken it to determine what it means.

BY MR. EPSTEIN:

**Q:** Okay.

**A:** Is it reliable? Is it not?

**Q:** Okay. Well, let's assume, just for kicks and giggles, that it was reliable. Where were the hottest temperatures recorded on August 11th, 2009, at 9:00 p.m.?

**A:** Well, the ones that -- hottest ones that were recorded were, it looks like, on cable 11.

**Q:** More than halfway below the center of the peanut pile, correct?

**A:** It was down in the peanut pile, yes.

**Q:** Okay. And whether you use a 30 degree or

38 degree angle of repose, and whether you use 20 or 25 or 23 feet as the height of the peanut pile or the distance of the peanut pile from the ceiling of the dome, you don't have any temperatures approaching the temperatures that you have on cable 11 at the bottom, do you? On the surface.

**A:** Right. Well, and again, we don't know what's going on with sensor 11 or sensor 3 or sensor 13.

**Q:** Sure. But for the data that you do have, you tend to have cooler temperatures by the surface than you do down below, correct?

**A:** That's right.

**Q:** Okay. If the fire was on the surface of the peanuts, why didn't the dry ice blanket extinguish it?

**A:** Because you have a smoldering fire, and the smoldering fires have worked themselves into the depth of the peanuts. They're not just going to sit there and burn on the surface; they're going to actually burn downward. And when you put the CO2 dry ice on top of it, that will help with a surface fire but not what's burning below it. I mean, it's the same thing if you had a smoldering fire on a couch. You can extinguish, you know, the fire on the surface, but you're not necessarily going to get into the -- into the substrate of that material.

**Q:** Doesn't the fact that the fire persisted for weeks following -- or for at least two weeks following the blanket of dry ice that was put on the surface of the peanut pile -- doesn't that suggest that it's more likely that the fire commenced below the surface than that the fire commenced on the surface?

**A:** No.

**Q:** Doesn't at all?

**A:** No.

**Q:** All right. I want to look more -- I said we'd come back to Dr. Montross' report.

**A:** Okay.

**Q:** I'm going to keep that promise.

**A:** I thought you'd forget.

**Q:** You don't know me very well.

I want to look at Figure 16 on page 59, because to this point we've just looked at his analysis of your analysis. Now I want to look at your analysis of his analysis.

**A:** Okay.

**Q:** Did you study his report well enough to get a grasp of what he's showing on Figure 16?

**A:** Yes.

**Q:** Okay. Can you explain, looking at Figure 16 -- and again, I understand that you're

questioning the accuracy of the temperatures recorded by the Safe Grain system.

**A:** Yes.

**Q:** For the sake of all of these questions I'm going to ask you, I'm going to ask you to assume the accuracy of those readings, okay?

**A:** Okay.

**Q:** If the jury should find that those readings aren't accurate, I fully expect them to throw out everything Dr. Montross says about those readings.

**A:** Okay.

**Q:** Makes sense. For the time being, assume that those are accurate readings. Can you explain why the average temperatures within what Dr. Montross described as the hot spot read -- were some 30 degrees hotter as of July 13th, 2009, than the average temperatures in the outer edges of the peanut mass, which was green on his Figure 16?

**A:** Well, some of it is going to be the natural, again, heating of the dome. But assuming they're accurate, then that would be from heating within the pile.

**Q:** There's no other way to explain that, is there?

**A:** Correct. I mean, there has to be some

heating or -- and some contribution from the -- the changes in the head space, et cetera, from the temperatures.

**Q:** But the head space isn't anywhere near where the hot spot was located, correct?

**A:** What do you mean "anywhere near"?

**Q:** Well, the hot spot wasn't in the head space and it wasn't on the surface, correct?

**A:** Right. But I'm saying it's driving some of that. But I would -- I would agree; the only way you get those things is from heating.

**Q:** And if what you said earlier about the sun and the way it's going to affect temperatures in the dome, you would expect that to be more on the outer edges of the dome than you would the interior of the dome, correct?

**A:** Outer edges and also depending on the sun angle -- I mean, you could have it directly above it as well.

**Q:** But you would expect the commodity that's closest to the concrete wall to receive more of that ambient heat coming from the sun than commodity that's more in the center of the peanut pile, correct?

**A:** Outside as well as on the surface.

**Q:** Okay. Well, we know from what's shown in

green in these temperatures that the temperatures reported on the outer ring of the temperature cables were actually significantly cooler than what was going on in the middle, correct?

**A:** They're cooler, yes.

**Q:** So if ambient temperatures outside the concrete walls are having an effect, that certainly doesn't explain why you have the coolest temperatures on the outside and the hottest temperatures in the peanut mass, correct?

**A:** Right. But you have a contribution from that. I'm saying you get some heating, yes.

**Q:** Okay. So let me take you back to Mr. Rich's testimony.

**A:** Okay.

**Q:** If you can grab that exhibit, which is Exhibit 263.

**A:** All-righty.

**Q:** And you'll recall that I took him through this same exercise, and I'm trying to truncate it with you. So I want to start on page 211.

**A:** Okay.

**Q:** Starting on line 16 -- this might seem familiar to you -- I said, "Can you explain why the average temperatures within what Dr. Montross described

as the hot spot were some 30 degrees hotter as of July 13th, 2009, than the average temperatures in the outer edges of the peanut mass, along the outer concentric circle? Why there would be a 30 degree difference between those two?"

Answer: "Well, without reading the whole report, my -- the only explanation I would have based on this is that there's some self-heating going on."

You agree with that, correct, Mr. Schumacher?

**A:** That's what he said or that --

**Q:** You agree that his analysis squares with your analysis of Figure 16?

**A:** Right.

**Q:** Okay. Page 212, line 9: "You can see it on July 13th where the hot spot is somewhere -- looks like about 85 degrees on average, and the ambient air rolling average is under 80 degrees. Does that not strike you as significant in terms of analyzing the self-heating going on within the dome?"

His answer was, "I would say it's -- yes. It's -- I wouldn't say it strikes me as significant. I think it strikes me as -- that there's -- if the numbers that he's taken are accurate, that that does suggest that there is some self-heating going on."

Would you agree not only that that's what Mr. Rich said but that Mr. Rich is accurate in that statement, that there's some self-heating going on as demonstrated by the hot spot being hotter than the rolling average of the ambient air outside?

**A:** I would agree.

**Q:** Okay. Page 213 -- I'm sorry -- 215, line 15: "Do you agree that the progression that we see from March to August in what Dr. Montross labels the hot spot -- I'm sorry -- March to July, was going to continue progressing after July 13th, 2009, if in fact self-heating was playing a role in that progression?"

Answer: "No."

Question: "You think it would just stop on July 13th?"

Answer: "It could have stopped at some time shortly after July 13th, yes."

Question: "And what would have led it to stop?"

Answer: "The death of the biological material that's creating a spontaneous" -- or sorry. "The death of the mold and the microbes that are creating this self-heating."

Question: "Okay. So you're in agreement that there were molds and microbes creating the

self-heating that we see evidenced on page 59, correct?"

Answer: "I'll say my understanding and experience is, with the stored commodity, that it is the mold and the microbes that initiate the biological heating. That's why it's biological."

Question: "And that's, in your opinion, what we see evidenced on page 59 of Dr. Montross' report in that red circle?"

Answer: "Given that this is accurate --"

Question: "Yes."

"And like I said before" -- "like I said, I haven't studied his report. So there may be things in his report I don't agree with, but based on the premise of your question, I would say, yes, that's self-heating from a biological -- or most likely self-heating from a biological event or biological source."

So I went a long way, Mr. Schumacher, to get to that last answer, and I want to -- I want to get you to say whether you agree with Mr. Rich that what we see in Figure 16 in Dr. Montross' report demonstrates self-heating from a biological event or biological source?

**A:** It certainly could be, yes.

**Q:** Okay. Go to the next page, which is page 217.

He said, "Well, I don't know specifically" -- wait a second.

I asked him at the bottom of 216, "You have no way of knowing whether that biological source would have continued to cause self-heating after July 13th, 2009, do you?"

And his answer was, "Well, I don't know specifically if this hot spot would continue heating, but I do know from my research and reading that the biological activity ceases at a certain temperature."

Question: "At which point, thermal runaway can begin, correct?"

Answer: "Not thermal runaway, but the oxidation reaction could then take over, which then could lead to thermal runaway, which then could lead to spontaneous combustion."

I want to stop there.

Do you agree with what Mr. Rich said, that once the biological activity ceased at a certain temperature, that oxidation could occur, which could lead to thermal runaway, which would lead to spontaneous combustion?

**A:** Yes, it could. Sure.

**Q:** So if the temperatures are accurate that Dr. Montross is relying on, what is demonstrated here,

especially from March 11th to July 13th, is self-heating from a biological source that could get to the point of a thermal runaway reaction, correct?

All other things being equal, that is a possibility of what we see being shown as a trend in Figure 16?

**A:** Right. It's a possibility, but it didn't happen, in my opinion.

**Q:** I understand it didn't happen, in your opinion. What Mills says is that if you got this process that we're looking at here that you've agreed would be, if the temperatures are accurate, self-heating from biological activity -- if you got that process to 176 degrees Fahrenheit, Mills said you're eventually going to get to ignition, correct?

MR. GOLDSTEIN: Objection.

BY MR. EPSTEIN:

**Q:** Likely?

**A:** He said you will likely, sure.

**Q:** Okay. So that's the question -- is, from what Dr. Montross shows here as of July 13th, between July 13th and August 11th, did you reach temperatures that would have led to that runaway reaction that led to ignition, if the temperatures again are accurate? That's the question. Correct?

**A:** And I say no.
**Q:** I understand that's your answer to the question.
**A:** Right. But, I mean, you're looking at the trends here, and you're saying, "Okay. This shows that there's heating going on." Well, that's fine, but the question is, does that heating -- does it mean anything? Are we concerned about it? And my answer is, no, we're not based on my analysis and based on his analysis.
**Q:** Okay. Because you can't get the temperatures all the way to 176 degrees or because you can't get the temperatures to over 500 degrees?
**A:** I can't get the temperatures to 120. He gets them to about 117 in the hot spot.
**Q:** You're saying Dr. Montross gets them to about 117?
**A:** Yeah, absolutely.
**Q:** All right. Page 239 of Mr. Rich's testimony.
**A:** Okay.
**Q:** Line 14, I asked him, "Assume for a moment that it is demonstrated to your satisfaction that the aluminum phosphide tablets applied on August 4th, 2009, had nothing whatsoever to do with the fire. Just assume for the sake of argument. Are you with me?"
He said, "Okay."

Question: "Assuming that were true, what would be the most likely explanation for the cause of this fire based upon everything you know?"

His answer was, "The -- one of my other -- well, the most likely would be one of my -- the likely ones would be one of my other hypotheses that I eliminated, and I would say the most likely would be that the self-heating progressed to thermal runaway, progressed to spontaneous combustion."

Do you agree or disagree that if you eliminate the Fumitoxin as a potential source of this fire, that what -- what Mr. Rich said is the most likely explanation for the cause of the fire?

**A:** Assuming the fire still actually occurs?

**Q:** Yes.

**A:** Okay. With that, if you can eliminate one of the two, then the most likely cause would be self-heating.

MR. EPSTEIN: All right. Why don't we go ahead and take a break.

THE VIDEOGRAPHER: Off the record at 4:27.

[RECESS TAKEN]

THE VIDEOGRAPHER: On the record at 4:36.

BY MR. EPSTEIN:

**Q:** Mr. Schumacher, looking for a last moment at Figure 16 from Dr. Montross' report.

**A:** Yes.

**Q:** You would agree that if the temperatures he's relying on were accurate, temperatures that had been rising due to self-heating caused by biological activity from March to June and June to July would have continued to rise between July 13, 2009, and August 11, 2009, correct?

**A:** No, not necessarily.

**Q:** Why is that?

**A:** Well, it depends on if that biological heating continues or if it dies out eventually.

**Q:** So you think it's just as likely that this trend would have stopped in the three or so weeks after July 13th before the fire was discovered?

**A:** Well, again, I've eliminated self-heating ignition as the cause. And so whether it stopped completely or -- either way, it didn't matter because you didn't reach the part -- the point of ignition or the temperatures where you needed to be in order to ignite the material.

**Q:** Go forward, if you would, to page 68, which is Figure 25.

**A:** Okay.

**Q:** Did you read Dr. Montross' report for how he came up with his red line in Exhibit -- I'm sorry -- Figure 25 --

**A:** Yes.

**Q:** -- which is his model hot spot?

**A:** Yes.

**Q:** He did that in a different way than you came up with your exponential and second order polynomial regressions, correct?

**A:** Yes.

**Q:** He used something that was based upon agricultural and biosystems engineering, correct?

**A:** Well, I suppose that that model is used there, yes.

**Q:** Okay. And you understand that somebody like Dr. Montross, who works with stored agricultural commodities and their temperatures, have means and methods to predict temperatures that are different than straight math. Do you understand that?

**A:** Yes.

**Q:** Okay. Do you have the ability to criticize the model that he used in this case?

**A:** Well, I mean, it's a model based on dry matter loss.

**Q:** Uh-huh.

**A:** And it's a model where he didn't have certain things for peanuts, and so he assumed certain items. And in that model, I believe he assumed no convective currents and basically just -- it was by conduction as far as heat transfer. And it was basically a -- oxidation of a carbohydrate was what he using to determine the heat generation.

**Q:** Okay.

**A:** And so, I mean, there's things that -- he's making a lot of assumptions in there. He has to in order to generate the model to figure out what temperatures he's predicting. And so there are assumptions that are being made in that model. I'm not certain I agree with all the assumptions that are made.

**Q:** Well, if you don't agree with any of them, I'd like to know today. This is my one chance to ask you about that.

**A:** Well, I mean, if he is in fact eliminating convective currents, I mean, that's a big way you actually transfer -- stuff goes through a baseline convection, and assuming you have no heat loss I don't think is accurate. You're always going to have some heat loss. So that should over-predict it. And certainly if he uses the number that he references in his report about

the number of BTUs generated, that would overestimate it as well. So those are the things that come to mind.

**Q:** Okay. Is there anything else about Dr. Montross' analysis of how you get the temperatures to the point of what his model shows -- I understand you contend his model doesn't show getting to the point of combustion. Let's put that aside.

Is there anything about what he shows of the temperatures he does get to that you believe is not supported by reliable science?

**A:** Well, I mean, he assumes a certain volume of peanuts that are at a moisture content that he -- that he uses as his area for heating as well as in the hot spot. And so, I mean, how he comes up with that and why he uses that, I mean, that's obviously an assumption.

**Q:** Okay. Anything else?

**A:** Well, that's what comes to mind, those -- those few.

**Q:** Okay. All right. Would you agree that Dr. Montross, based upon what he does for a living, knows a lot more about the biological heating of stored commodities than you do?

**A:** No, I wouldn't.

**Q:** You wouldn't?

**A:** No.

**Q:** You know as much as he does about the biological heating of stored agricultural commodities?

**A:** When you're talking about self-heating to ignition and investigating fires involving these, I would say no. I have more experience than he does.

**Q:** I'm talking about the processes by which stored commodities biologically heat.

**A:** I mean, I can't answer that.

**Q:** Okay. I want to move to the section of your report that is titled "Autoignition of Phosphine Gas as a Result of Piling of Fumitoxin Tablets."

**A:** Okay.

**Q:** Which is your theory as to what caused this fire, correct?

**A:** Yes.

**Q:** On -- you wrote on page 11 -- you quoted from the Fumitoxin Applicator Manual that "Aluminum phosphide tablets and pellets outside their containers should not be stacked or piled up or contacted with liquid water. This may cause a temperature increase, accelerate the rate of gas production, and confine the gas so that ignition could occur."

Why did you include this quotation from the applicator's manual in your report?

**A:** Because it's -- it's provided by the

distributor, and they provided that information to the EPA, and it's -- it's information about what can happen when you pile up or stack these particular tablets or pellets. And so it's supportive of the theory that I have in this case.

**Q:** Do you have any idea what the origin of that quoted language is?

**A:** Well, I believe it came from the manufacturer or distributor.

**Q:** Do you know whether the EPA requires this statement to be included for all applicator's manuals for aluminum phosphide products?

**A:** Well, I imagine they would, but I think it originally comes from the manufacturers or distributors.

**Q:** Do you know if any scientific research or testing was undertaken by any manufacturer, distributor, laboratory, or government agency which led to the quoted language being required in manuals for aluminum phosphide products?

**A:** Well, I don't know the origination of that statement, no.

**Q:** Okay. Would you agree with me, Mr. Schumacher, that the quoted language by itself does not serve as a scientific basis for concluding that

stacking or piling dry aluminum phosphide tablets is likely to result in a fire?

**A:** Well, I mean, in and of itself, no, but clearly that's what the manufacturers are saying. And that's consistent with other information that's out there; that's consistent with field experience showing it happens; that's consistent with case studies that show that it happens. And so, you know, that in and of itself, no. But clearly I can rely on that as supportive of my opinion because it comes from the manufacturer, the people who make this and distribute it.

**Q:** In your view, that one sentence is as reliable scientifically as testing in a laboratory demonstrating that piling of aluminum phosphide tablets will result in ignition? The statement that's in the applicator's manual is no different than a certified laboratory test that shows that phenomenon to occur?

**A:** I mean, it really depends on what that certified laboratory is doing when they're testing it. How many of these particular items are they testing? And how are they determining concentrations? And how are they determining temperatures? And are they doing this in a fashion where you do several tests that make it statistically significant? Are you actually changing the parameters that are important as far as is -- are you

changing the number of tablets and pellets, how you stack them, et cetera?

And so if you have all of that data for a wide number of tablets, then that would be potentially more meaningful, but -- however, that statement is what it is.

**Q:** Even though you have no idea whether there's any scientific research or testing that led to that statement?

**A:** Well, I know that there are stuff that you had referenced that I had referenced -- or you had pointed to that I had referenced in my paper on limited testing that was done with limited number of tablets and pellets, but as far as other stuff, I don't know of -- and again, this is consistent with field experience, consistent with what people see and what happens in other cases.

**Q:** Did you read Mr. Ryman's deposition testimony in this case?

**A:** Mr. Ryman with Degesch?

**Q:** With Degesch. His expert deposition testimony. He was -- his testimony as an expert was taken a few weeks ago.

**A:** Yes.

**Q:** Did you read that testimony?

**A:** I did.
**Q:** And did you review what he said about that language and what it really should say?
**A:** No. You can point it out. Well, I did review it, but specifically what section are you --
**Q:** That the reality is -- is that the real danger is the piling of aluminum phosphide tablets and the introduction of liquid water, not or?
MR. GOLDSTEIN: Objection.
THE WITNESS: I mean, you have to point me to that because what he did say is that, yes, the piling of aluminum phosphide tablets without the presence of water can result in a fire.
BY MR. EPSTEIN:
**Q:** You think that's what Mr. Ryman said?
**A:** Sure. He said he agrees with that.
**Q:** He said he agrees with that as a precautionary statement, didn't he?
MR. GOLDSTEIN: Objection.
THE WITNESS: He agrees that -- no. He said it -- that it can happen when he was asked of it, and of course there's no reason to put a precautionary statement in there if it can't happen. That just doesn't make any sense.
BY MR. EPSTEIN:

**Q:** That statement certainly doesn't say anything about the likelihood that that phenomenon will cause a temperature increase or a fire, does it?
**A:** No. Just like it doesn't say the likelihood of a cigarette igniting a trash can, but we know that that happens.
**Q:** Okay. So if it happens one out of a million times, you think you can rely on that as your scientific support for the cause of the fire in this case?
**A:** Well, I mean, I haven't -- I don't know where that statistic came from because --
**Q:** I'm just using that as a hypothetical.
**A:** -- certainly happens far more than that. We have cases in California. There are, I guess, five a year over ten years where they had fires with aluminum phosphide.
**Q:** Where did you get that from?
**A:** That was in Vito Borrowski's [PHONETIC] report.
**Q:** Did you know he was wrong about that?
**A:** I didn't check that. I'm just quoting what he said.
**Q:** If he was wrong about that, do you want to take -- would you take that back?
**A:** I'd have to evaluate it.

**Q:** Okay.
**A:** But the fact is these fires do occur.
**Q:** Okay. So the first thing that came to your mind is five a year in California based upon what Vito said, right?
**A:** Well, that and -- and other cases that I've seen it occur in other case studies where they've talked about it and field experience where it actually happens --
**Q:** So you are --
**A:** -- where we've seen it occur.
**Q:** -- you're willing to rely on what Vito said without even looking to see whether what he said was accurately referencing the material he was referencing?
**A:** I hadn't looked at it; that's right.
**Q:** If you'd looked at it, you might have come to a different conclusion; isn't that possible?
**A:** It's possible.
**Q:** Yeah. How do you get from the quoted language that said it's possible for there to be a reaction that would result in the generation of heat to the point of ignition to the probability that ignition occurred from the stacking of piling -- stacking or piling of tablets in the peanut dome?
**A:** Well, it's the whole process that we talked

about ad nauseam today. You go through the process of eliminating certain causes, and then you look at the other potential cause and you look at the manner in which the tablets were applied and the configuration, et cetera, and the constraints under which they were applying the tablets. And you look at the scientific literature. You look at science. You look at the available information out there, field experience. And you know that this happens. And so you're able to, based on a reasonable degree of engineering certainty, say that is what caused the fire.

**Q:** Based upon anecdotal incidents that have been reported one at a time?

**A:** I wouldn't say anecdotal. They're actually investigations conducted regarding these incidents, and then you have people who have actually seen it happen. I mean, I know that Degesch was getting reports of fires, and they were trying to test it, and they couldn't replicate it. So they're getting field experience saying that they're having fires with their materials. That's what Ryman said.

**Q:** Fires or flashes from the opening of the flasks?

**A:** No; fires. They had -- we talked about a fire that he did some experimentation on to try to

recreate.
**Q:** Well, phosphine is a flammable gas, correct?
**A:** Right.
**Q:** If you combine water with aluminum phosphide tablets, there it's demonstrated through scientific testing that you're likely to get a fire, correct?
**A:** Right. You can get a fire, yeah.
**Q:** There's no scientific testing that demonstrates in the absence of water you're likely to get a fire, is there?
**A:** There is testing that was done that shows you will get to the LFL based on a certain pile size, and that's Dale Mann's testing. He's almost reaching the LFL in that testing. And so their -- the testing that was done related to moisture, not liquid water, was on limited numbers of tablets.
**Q:** Okay. So just to make sure we're clear, Dale Mann has proved, as an expert for me, that you get to the lower flammable limit by piling Fumitoxin tablets; is that your testimony?
**A:** I may have misspoke. He didn't -- he didn't get to the LFL, but he showed the trend that if you add some more tablets to it, you will reach the LFL.
**Q:** And Dr. Montross has proven as an expert for

me that self-heating wasn't a cause of this fire, correct?

**A:** I think his data shows that, right.

**Q:** Okay. And Mr. Ryman says that you're right to rely on the warning in the applicator's manual about stacking or piling for the conclusion that stacking or piling leads to the lower flammable limit being reached and combustion? He says that?

**A:** He says you -- that can happen, yeah.

**Q:** So basically all the experts that are testifying for me and the defendants in this case are actually supporting you; is that your testimony?

MR. GOLDSTEIN: Objection.

THE WITNESS: I think these -- some of the things they're saying support me and some of the work they've done support what I'm talking about, yes.

BY MR. EPSTEIN:

**Q:** You didn't pay attention to where Dr. -- where Mr. Ryman says in his report, you can't sufficiently contain phosphine in a pile of aluminum phosphide to reach the lower flammable limit? You didn't read that?

MR. GOLDSTEIN: Objection.

THE WITNESS: I read that in his report. I also read in his deposition as an expert where he said

this can happen. And so how you can not confine it but yet have it happen, I don't -- I don't get that. So I think he's saying it can happen. And so it's a little bit different in his report and his 30(b)(6) deposition.

BY MR. EPSTEIN:

**Q:** Did you read in -- and I can show it to you, if you want -- in Mr. Ryman's expert report, his comment about the statement we just looked at in Section 4.2 of the manual "being merely precautionary and does not mean and was not intended to convey that the piling or stacking of tablets will result in the LFL of phosphine gas being reached, let alone a fire."

Did you appreciate that he had said that --

**A:** That --

**Q:** -- about the statement that you're relying on?

**A:** Right; that it's a precautionary statement. But then he goes back and says, yes, it can happen. So there are two different things he's saying there.

**Q:** Had you ever seen the Fumitoxin Applicator's Manual before the -- before 2009?

**A:** I think I answered that. No, I had not seen it. Maybe I hadn't answered it. I'm sorry.

**Q:** I think you answered the question about

whether you had ever become aware of aluminum phosphide tablets before 2009.

**A:** Right. And I figured it was obvious. I probably hadn't seen the manual. Sorry.

**Q:** Back to your report. You compared what's in the applicator's manual to, quote, similar admonitions and discussions regarding piling of the tablets or pellets found in numerous sources, correct?

**A:** Yes.

**Q:** And you cite Footnote 71, 72, 73, 74, 75, correct?

**A:** Yes.

**Q:** Well, 71 and 72 are simply applicator's manuals that are saying the same thing, correct?

**A:** Right.

**Q:** Because the EPA requires them to say the same thing, don't they?

**A:** Well, because it's their product and they have to warn against potential issues with their product, like piling and stacking and causing ignition that way.

**Q:** You also cite the material safety data sheet, right?

**A:** Yes.

**Q:** Have you read that?

**A:** I've seen one, yeah. Whatever -- yeah, of

course.

**Q:** Showing you what's being marked as Exhibit 275.

[EXHIBIT NO. 275 MARKED FOR IDENTIFICATION]

BY MR. EPSTEIN:

**Q:** Show me where in the material safety data sheet it says that the piling of aluminum phosphide tablets or pellets without contacting liquid water presents a fire hazard.

**A:** Well, I'm not sure if this is exact MSDS that I looked at.

**Q:** This is the material safety data sheet for aluminum phosphide, correct?

**A:** Right. There are, I think, different MSDS's for aluminum phosphide.

**Q:** Okay. This is --

**A:** -- Fumitoxin.

**Q:** -- specifically for Fumitoxin tablets and pellets --

**A:** Right.

**Q:** -- which is what was used in our case.

**A:** Right; but there are different -- my point is there are different iterations of this thing. And so let me take a look at this one.

**Q:** Well, the unusual fire and explosion hazards are listed on the second page.

**A:** Well, I don't see anything about tablets, but I do see something about confinement of partially spent residual materials as in an enclosed container or collection and storage of large quantities of dust may result in a fire or explosion hazard.

**Q:** Okay. That's after the reaction's already over, correct?

**A:** Well, no. The reason why is you have material that's not reacted, and so it's the same -- same concept. You're going to have phosphine being ignited because it reaches the autoignition.

**Q:** That's talking about how to dispose of the spent material, correct?

**A:** Right. But it's talking about unreacted material, and it's talking about large quantities of dust may result in a fire explosion hazard. It's the same concept.

**Q:** Okay. Let's look at what they say about piling of large quantities of Fumitoxin tablets or pellets, okay?

**A:** Okay.

**Q:** Page 2, under "Unusual Fire and Explosion Hazards."

**A:** Yes.
**Q:** About eight lines down, there's a sentence that begins "Spontaneous ignition," which is what you're saying happened in this case, correct?
**A:** Yes.
**Q:** It says, "Spontaneous ignition may occur if large quantities of aluminum phosphide or magnesium phosphide" -- can you please finish that for me.
**A:** -- "are piled in contact with liquid water."
**Q:** Not an "or" proposition in the MSDS, is it? It's piled in contact with liquid water, correct?
**A:** That's what it says.
**Q:** The MSDS says exactly what the Underwriting Laboratory tests show, correct?
**A:** No. It's -- it's talking about liquid water, but also they're -- it's talking about spent material that can also react. So it's the same concept.
**Q:** Where in your 14-page report do you say anything about spent material or applicator instructions or MSDS's about spent material?
**A:** Well, I haven't said anything about it, but again, it's the same -- same idea. You're not -- you're not using liquid water. You're using the moisture in the air, which is creating the ignition scenario.
**Q:** What the MSDS says that's different from the

applicator's manual is that if you pile aluminum phosphide in large quantities in contact with liquid water, in that event, you are at risk of spontaneous ignition, correct?

**A:** Say that one more time.

**Q:** What the MSDS says that's different than Section 4.2 of the applicator's manual is that if you pile large quantities of aluminum phosphide tablets or pellets in contact with liquid water, that is when you have a danger of spontaneous ignition, correct?

MR. GOLDSTEIN: Objection.

THE WITNESS: That's what this particular MSDS is showing, yes.

BY MR. EPSTEIN:

**Q:** Okay. Have you ever met Dr. Brown before?

**A:** Before this case?

**Q:** No; before today.

MR. GOLDSTEIN: Objection.

THE WITNESS: As in Dr. Steve Brown?

BY MR. EPSTEIN:

**Q:** Yes.

**A:** Yes.

**Q:** You met him at that December 2012 meeting that you described that occurred here at Quick Widis?

**A:** Yes.

**Q:** Is that the only time you ever met him?
**A:** Yes.
**Q:** Have you spoken to him on the phone since that time?
**A:** No.
**Q:** Have you reviewed his expert report in this case?
**A:** I believe I have, yes. Of course --
**Q:** Have you reviewed his deposition testimony in this case?
**A:** Yes.
**Q:** Do you think this man knows what he's talking about when it comes to fumigating agricultural commodities with phosphine?
**A:** Yeah, I would think he knows.

[EXHIBIT NO. 276 MARKED FOR IDENTIFICATION]

BY MR. EPSTEIN:
**Q:** Okay. Show you what's Exhibit -- been marked as Exhibit 276.
Have you seen this publication before from the Alabama A&M and Auburn University Extension Service?
**A:** I have not.
**Q:** Okay. If you'll go to the last page, you'll

see it's an article co-written by Dr. Steve Brown.

**A:** Can you tell me where it starts?

**Q:** I'm sorry. The last page. I wanted just to --

**A:** Last page.

**Q:** The last page, it shows who wrote this article, Kathy --

**A:** Oh, I got you.

**Q:** Kathy Flanders, extension entomologist, associate professor, entomology and plant pathology, Auburn University. And Steve Brown, extension entomologist, professor, entomology, Georgia Cooperative Extension Service, University of Georgia, right?

**A:** Okay.

**Q:** Go to page 6. First full paragraph in the middle column, they write, "Do not allow the aluminum phosphide to contact liquid water, and do not leave aluminum phosphide pellets or tablets in piles because doing so interferes with the proper release of the phosphine gas. It also increases the risk of explosion or fire" -- can you finish that for me, please.

**A:** -- "should the pile be suddenly exposed to water."

**Q:** Right. So what they describe as the risk of a pile of aluminum phosphide tablets is there's a risk of

explosion or fire should the pile be suddenly exposed to water, correct?

**A:** That's what it says here.

**Q:** So that's two sources, the MSDS, Exhibit 275, and the Alabama Cooperative Extension System article, "Fumigating Agricultural Commodities With Phosphine," that indicate that liquid water is required in order to get a pile of aluminum phosphide tablets to spontaneously combust, correct?

MR. GOLDSTEIN: Objection.

THE WITNESS: You're referring to this article and the MSDS?

BY MR. EPSTEIN:

**Q:** Yes.

**A:** And again, I don't know if that's the MSDS I looked at, but that one says that. As far as this article, that's what it says just reading it. What he actually meant by that, I don't know.

**Q:** Okay. But as opposed to what these two exhibits say, you're hanging your hat on what the applicator's manual says, correct?

**A:** It's not just the applicator manual. There are other things that say the same thing.

**Q:** Okay. What else?

**A:** Well, there's -- whatever I've referenced

down there.
**Q:** Oh, "Stored Product Protection," Chapter 14?
**A:** Yeah.
[EXHIBIT NO. 277 MARKED FOR IDENTIFICATION]
BY MR. EPSTEIN:
**Q:** Show you what's being marked as Exhibit 277.
**A:** Okay.
**Q:** Can you first confirm that this is the publication and the chapter within the publication that you were referring to in Footnote No. 74?
**A:** Yes.
**Q:** I think you're referring to page 163.
**A:** Okay.
**Q:** There's a statement that "Spontaneous ignition of phosphine gas, if the gas concentration exceeds 18,000 parts per million" -- how often does it say that happens if you get to 18,000 parts per million?
**A:** It says "rarely happens."
**Q:** Rarely happens.
**A:** Okay.
**Q:** Even at 18,000 parts per million.
**A:** Okay.

**Q:** Isn't that consistent with what Dennis Ryman testified to and opined in his report?

**A:** It says "rarely happens," but we see that it happens. We know it happens.

**Q:** Okay. And it says, "It could occur if large numbers of phosphide pellets or tablets quickly generate gas in a small-volume space."

Do you see that?

**A:** Yes.

**Q:** The Severn peanut dome wasn't a small-volume space, was it?

**A:** No; but you're looking at areas local -- localized areas to the actual pile itself, not the entire dome.

**Q:** Is that what you think that the authors here are talking about when they refer to a small-volume space?

**A:** Well, that may not be what they're talking about, but that's what I'm talking about.

**Q:** Okay.

**A:** You have to take a look at the area around the actual pile, not the entire volume of what you're fumigating.

**Q:** Okay. So you have -- MSDS says that you need contact with liquid water. You have the Alabama

Extension -- Alabama Cooperative Extension article that says you need contact with liquid water. The Stored Product Protection chapter that you referenced saying that, even if you have piling and even if you get to 18,000 parts per million, you're rarely going to have a fire as the result of that, correct?

**A:** That's what that's saying, sure.

**Q:** All right. What else did you rely on?

**A:** Well, there's the Herbert Rauscher article.

**Q:** That Mr. Ryman talked about in his deposition, correct?

**A:** Yes.

**Q:** And that's it? That's all you got?

**A:** Well, there are others out there that I haven't referenced, but -- but this -- there are references that say this happens.

**Q:** And a reference that says it happens is a reliable scientific basis to form an opinion as to the cause of a fire in a 2-million-cubic-foot peanut storage dome; is that right?

**A:** Well, you look at the available references that talk about the likelihood of it happening and it shows it can happen. You have the applicator's manual and label that says it can happen. You have all these other things; for instance, the other case studies,

the -- the people actually witnessing it happen. And so you have direct observation of the guys in the field doing it who says it -- who say it happens.

**Q:** Mr. Schumacher, you have direct observations of the guys who apply the Fumitoxin tablets saying they applied it in such a manner as to not cause piles, and yet, you feel perfectly comfortable saying, "Well, they're wrong about that and I'm right"?

MR. GOLDSTEIN: Objection.

THE WITNESS: That's right; based on how they said they did it, based on the constraints under which they were trying to apply it. I mean, how it would fall out of the flask, I agree that it's incorrect what they're saying.

BY MR. EPSTEIN:

**Q:** But what all these other people have said in these case studies and incident reports and anecdotal examples, that's your scientific basis for saying that the piling of Fumitoxin tablets in this instance created the lower flammable limit being reached and ignition, based upon what these people that you don't even know have to say about incidents that you weren't involved in investigating; is that right?

MR. GOLDSTEIN: Objection.

THE WITNESS: That is information I can

rely upon. These people who are doing investigations into these causes, the references that say it can and will happen, yes, I can rely on those.

BY MR. EPSTEIN:

**Q:** Even when there are other published sources that say it can't happen in the absence of liquid water?

**A:** They don't say it --

MR. GOLDSTEIN: Objection.

THE WITNESS: -- can't happen in the absence of liquid water. Your -- they said with water, but it didn't say if you have just moisture, it can't happen. There's nothing in there that says it can't happen if you just have moisture.

BY MR. EPSTEIN:

**Q:** Mr. Schumacher, with all this conflicting information out there, don't you think you should have tested -- if it's that easy to prove that you're right, don't you think you should have done it?

MR. GOLDSTEIN: Objection.

THE WITNESS: No, I don't need to do it.

BY MR. EPSTEIN:

**Q:** Okay. Are you familiar with case law under Daubert versus Merrell Dow Pharmaceuticals that has

required fire investigators to physically test their theories at the risk of being excluded from testifying?

MR. GOLDSTEIN: Objection.

THE WITNESS: I obviously don't know case law as well as you do.

BY MR. EPSTEIN:

**Q:** You're not aware that there are cases out there in which experts professing to an opinion as to origin and cause of a fire have been excluded because they have not physically tested their theory? You're not aware of that?

MR. GOLDSTEIN: Objection.

THE WITNESS: I'm not aware of that.

BY MR. EPSTEIN:

**Q:** Okay. And physically testing your theory wouldn't give you a more reliable scientific basis for your hypothesis in this case than the information upon which you are currently relying?

**A:** Well, again, I don't need to do the testing. I can rely upon that information and that data.

MR. EPSTEIN: Can you read it back to him, please.

[RECORD READ]

THE WITNESS: Testing it could bolster it, but I don't need to do that.

BY MR. EPSTEIN:

**Q:** Go to page 12 of your report.

**A:** Yes.

**Q:** You said, after Footnote 78, "Piling of the tablets in one area which effectively decreases the heat loss causes the temperature rate of phosphine gas generation and local phosphine gas to increase."

Take that one sentence. Show me your scientific support for that statement.

**A:** Basically you have -- that's what's going to happen in a pile under a certain configuration. It's just the Arrhenius equation, temperature and rate of reaction.

**Q:** Show me any literature, show me any testing, show me any report of some anecdotal incident that establishes that piling of tablets in one area effectively decreases the heat loss, causes the temperature rate of phosphine gas generation and local phosphine gas to increase?

**A:** Well, the testing that Dale Mann did shows that the concentration increases and that the -- it leads to higher concentrations in a pile than it does if it's singular.

**Q:** And causes the temperature to increase at the same time? Dale Mann showed that?

**A:** He showed that there's a slight difference in when the phosphine is at its highest and when the temperature is at its highest in that particular configuration.

**Q:** He didn't get temperatures when the phosphine gas was being generated to its highest level -- he didn't get temperatures above ambient temperatures, did he?

**A:** Initially that's correct, in that situation. But he got high concentrations of gas from piling.

**Q:** And without an increase in temperatures, you're not going to get autoignition of that gas, are you?

**A:** Under that scenario, unless you have diphosphines being generated or unless you have the pyrophoric nature of this material coming into play. That's one method of igniting it.

**Q:** In fact, not only do you not have a source to cite me right now to support the statement that you wrote there; there's not a footnote supporting the statement in your report, is there?

**A:** Footnote supporting what?

**Q:** The statement that "Piling of tablets in one area which effectively decreases the heat loss causes the temperature rate of phosphine gas generation and local phosphine gas to increase," that statement isn't

supported by a footnote, is it?

**A:** Actually, if you look at the other ones, 79 through 84, that speaks specifically to this -- this concept.

**Q:** Well, what the Swedish Club and Australian Government, and State of California -- what all of those are are incident reports of individual incidents, correct?

**A:** That's right; with people investigating them.

**Q:** Like you.

**A:** Correct. The State of California being an independent group.

**Q:** None of that is peer-reviewed literature, correct?

**A:** That's right.

**Q:** None of that is testing done by a certified laboratory, correct?

**A:** It's not testing, no.

**Q:** Okay. Did you have any concept about Daubert versus Merrill Dow Pharmaceuticals requiring a scientific opinion to be grounded on testing and/or peer-reviewed literature?

MR. GOLDSTEIN: Objection.

BY MR. EPSTEIN:

**Q:** Do you have an understanding that Daubert generally requires that?

MR. GOLDSTEIN: Objection.

THE WITNESS: I don't under -- I don't have an understanding that you're -- you're allowed to base your opinion on science and base your opinion on literature that's out there, field experience, your education, your experience. And so there are a lot of things you can base your opinion on.

BY MR. EPSTEIN:

**Q:** Okay. And so in your -- in this case, you based your opinion as to what caused the fire on your education, your experience, what some applicator manuals say about Fumitoxin or aluminum phosphide, and some incident reports where people like you have investigated fires; is that basically correct?

MR. GOLDSTEIN: Objection.

THE WITNESS: And based on science and based on field experience of people in the field, the information that we've been talking about.

BY MR. EPSTEIN:

**Q:** Incidents that have occurred in the field; what's in the applicator's manuals; and your education, training, and experience as a fire investigator; that's what you're bringing as science to your conclusion in

this case, correct?

**A:** Well, also all the other stuff that's in my report that we've talked about, all the other references that I've -- I've put in there support the opinion that piling of tablets will lead to ignition under a certain pile size and condition.

**Q:** What certain pile size?

**A:** Well, I told you, I can't tell you exactly that pile size, but it will happen.

**Q:** Is there anything that you have referenced or reviewed in your work on this case that talks about a pile size that is necessary in order for there to be a confinement of gas and ignition?

**A:** No; because I don't know the pile size because it's too dependent on the configuration and all the other parameters.

**Q:** All right. You said you were relying on -- let's go back to Exhibit 277, because that's one of the sources in your group of footnotes from 79 to 84. In fact, you said, "This ignition scenario has been referenced in various sources." So where in that section that we were just looking at does it say anything about piling causing a decrease in heat loss and an increase in temperature and phosphine gas generation?

**A:** What page is that on again? I --

**Q:** I think it was on --
**A:** I seem to have lost it.
MR. GOLDSTEIN: 163.
BY MR. EPSTEIN:
**Q:** -- 163. Because you say you're citing that source for the statement that "Piling of the tablets in one area which effectively decreases the heat loss causes the temperature rate" -- "the temperature, the rate of phosphine gas generation, and local phosphine gas to increase. This ultimately results in the" -- "in autoignition of the phosphine gas."
Where does it say anything like that in this chapter on stored product protection?
**A:** Well, it talks about -- here, it talks about ignition of fires, depositing in piles in which the pellets are touching each other or when standing water is present. I mean, that part is what I'm referencing there. And basically, as with spontaneous combustion under high concentration fire hazard from piling can be avoided by proper application. So what I'm saying regarding this reference is that the piling of the tablets just with moisture leads to -- can lead to ignition.
**Q:** Okay. There is no source that says piling ultimately results in autoignition of phosphine gas. No

source says that.

**A:** I'm talking about the process. Sources say, basically, that piling of tablets or pellets can lead to ignition even if you just have moisture. And what I'm describing here is the process of that occurring. You pile it, and eventually you lead to ignition of the phosphine gas. And so there are sources that say, yes, basically you will have -- you can have ignition; so you will have that from autoignition.

**Q:** There is no source that says you will have autoignition of the phosphine gas resulting from the piling of tablets or pellets?

**A:** That's right.

**Q:** There is none?

**A:** There is no source, and I'm not saying that it happens every time. What I'm saying is, in describing the ignition scenario that occurs when you get ignition from piling, that is ultimately what happens.

**Q:** And here, you know you have ignition because you had a fire, right?

**A:** Yes.

**Q:** Based upon your analysis and Mr. Turner's and Mr. Lilley's testimony, you had piling, correct?

**A:** Yes.

**Q:** And because there are references that say

it's possible that piling can lead to ignition, you concluded that's what you had here, right?

MR. GOLDSTEIN: Objection.

THE WITNESS: No. I mean, again, we go through the whole process of how we get to this point, and there's a lot more to it than what you just described. Ultimately you eliminate self-heating to ignition of the peanuts as a cause. Then you look at the manner in which the pellets -- or excuse me -- the tablets were applied in this case, and you know how they're going to come out of the flask and how -- the constraints you're under in applying them, and you know that that is an ignition source and a potential ignition scenario, and you can conclude that that happened in this case.

BY MR. EPSTEIN:

**Q:** And you can conclude that without having demonstrated that piling, in and of itself without the introduction of liquid water, can contain sufficient gas to lead to the autoignition of phosphine gas? You can -- you can get from the piling to the fire without demonstrating that piling can lead to the fire?

**A:** That's right. I don't need to demonstrate it. The science shows it's going to happen and all the literature and field experience, et cetera.

**Q:** Well, we've already been through literature that shows you need liquid water, correct?

MR. WIDIS: Objection.

THE WITNESS: Well, the two you referenced say liquid water, but it doesn't say with moisture it won't happen.

BY MR. EPSTEIN:

**Q:** Dale Mann's report says you need liquid water, correct?

**A:** Well, that's fine. That's his opinion. But he did limited testing on the tablet size.

**Q:** Underwriting Laboratories' reports all show that you need liquid water, correct?

**A:** Right; with the limited number of tablets they used in their pile size.

**Q:** And you keep on criticizing the limited number of tablets that were used, and you've testified that you could have shown by using more tablets that you would get to a fire, but you decided against doing that, right?

**A:** I decided I didn't need to do it; that's right.

**Q:** Wasn't the concern that if you tried you might not get the outcome you wanted?

**A:** No.

**Q:** That wasn't it?
**A:** You would have reached the LFL for sure.
**Q:** For sure? And you could have demonstrated that?
**A:** Right.
**Q:** You just didn't --
**A:** I didn't need to do it, no.
**Q:** Okay.
THE WITNESS: Is it a reasonable spot to take a quick break?
MR. EPSTEIN: Sure.
THE VIDEOGRAPHER: Off the record at 5:23.
[RECESS TAKEN]
THE VIDEOGRAPHER: On the record at 5:30.
BY MR. EPSTEIN:
**Q:** All right. We're going to page 13 of your report, Mr. Schumacher. And since it only has 14 pages, we are getting close to being done.
**A:** Okay.
**Q:** We've been over this before, but on No. 6, you're giving the reasons why you concluded that there was piling. Most probably was piling on the surface of the peanut pile. Number 6, you said the peanut pile had

a ten-foot flat section at the top, and the surface was not smooth and likely had dips in it, creating locations for piling of the tablets.

Again, as you sit there right now, you don't know where you got the ten-foot flat section from, correct?

**A:** That's right. I know I could point to flat section, but that ten foot, I'd have to do some looking into.

**Q:** Okay. And there's nobody who testified that there were dips in the surface in that flat section, correct?

**A:** Well, I don't know that anybody was specifically asked if there were dips or not.

**Q:** But you concluded it likely had dips in it, correct?

**A:** That's right.

**Q:** Any particular reason why?

**A:** Well, just the way that things are going to settle differently in a pile. I've seen peanuts, the irregular shape of them. I've seen other commodities in bins, and they're not flat; there are dips.

**Q:** Showing you what's been marked as Exhibit No. 7.

Do you recall seeing this picture before,

Mr. Schumacher.

**A:** I don't even know what that is.

**Q:** You've never seen the soldier that R.P. Watson testified about?

**A:** I have, but I can barely --

**Q:** I know. It's not a good picture.

**A:** It's a terrible picture. I -- don't take that personally. I'm just saying I can't really tell you much from this picture.

**Q:** Okay. I'll show you that picture on my computer, then, so you've get a better picture of it.

**A:** Okay.

**Q:** Much better. Okay. See Exhibit 7 on my computer?

**A:** I do.

**Q:** Okay. Have you seen that before?

**A:** I have.

**Q:** Okay. Do you recall R.P. Watson's testimony about what that is?

**A:** Yes.

**Q:** And what is it?

**A:** It's a soldier.

**Q:** Okay. And where was it located in the dome?

**A:** I -- I think it was near the center.

**Q:** Right. Well, would you agree with me that that's not the type of surface you are talking about being at the flat section on the top of the peanut pile?

MR. GOLDSTEIN: Objection.

THE WITNESS: Well, I mean, this is not even remotely representative of what's going on in the dome, and this has been after you've actually drained a lot of the peanuts out of the dome through the chutes in order to allow you to go in and remove them from the dome. And so this is totally different than what you would see if you looked inside the dome.

BY MR. EPSTEIN:

**Q:** Okay. So you don't think the surface of the peanut pile that was underneath where Mr. Lilley and Mr. Turner were applying Fumitoxin tablets had anything to do with the soldier?

**A:** Well, I don't think that that's what the surface would look like, no, because you've had a lot of peanuts removed from there.

**Q:** Okay. Did you review the sworn testimony of Randy Turner and Brian Lilley as to how they applied the tablets?

**A:** I did.

**Q:** And you had forgotten that Mr. Turner applied

the tablets using two different methods, correct?

**A:** I had forgotten that, but it doesn't matter because he occasionally used his hands to throw them. The majority of the time, he was actually shaking the flasks.

**Q:** And did they testify that they applied the tablets in a manner that prevented piling or that led to piling?

**A:** Well, I mean, they described how they actually said they applied it. And I -- and, you know, there's no way it did not lead to piling.

**Q:** There's no way? Not possible?

**A:** No, it's not.

**Q:** You're a hundred percent certain that what they did led to piling, 100 percent?

**A:** Based on a reasonable degree of engineering certainty, yes.

**Q:** Okay. Okay. Are you 100 percent certain, or are you not 100 percent certain?

MR. GOLDSTEIN: Objection.

THE WITNESS: I am confident based on a reasonable degree of engineering certainty that there was piling underneath them based on the method that they used to apply the tablets to the dome.

BY MR. EPSTEIN:

**Q:** So you're not absolutely certain?

MR. GOLDSTEIN: Objection.

THE WITNESS: I go -- I gave you what I am. I -- based on a reasonable degree of engineering certainty, there was piling based on their application.

BY MR. EPSTEIN:

**Q:** Okay. Let me ask you this question: Under NFPA 921, are you as a fire investigator permitted to discredit the sworn testimony of those who were directly involved in the event that you conclude caused the fire if you do not have physical evidence to the contrary?

**A:** You're allowed to look at their testimony and to evaluate that testimony based on all the conditions related to that fire. And you can test the veracity of that statement, the accuracy of that statement based on science, based on demonstrative testing, based on all kinds of other information that allows you to say, "Well, I don't think that what he's saying or she's saying is accurate." And so, yes, you can look at it and test the accuracy of somebody's statement, whether or not it's under oath or not, and determine if it is accurate or not.

**Q:** Are there any eyewitnesses in this case who testified as to actually seeing the distribution of the tablets on the surface of the peanut pile on August 4th,

2009?

**A:** Are there any eyewitnesses besides Turner --

**Q:** Any.

**A:** -- Turner and Lilley?

**Q:** So there are two?

**A:** Right.

**Q:** And you do discredit their testimony, don't you?

**A:** I don't think it's accurate. Yes.

**Q:** Okay. Show you what's been marked as Exhibit 201.

**A:** Okay.

**Q:** Go ahead and take a look at that.

**A:** Okay.

**Q:** Mr. Turner testified that after he was done with the application, he looked into the pile with his flashlight and, quote, "I could see that the tablets had been scattered. They were all across the peanuts."

And he was asked, "How much of the pile could you see?"

He said, "I could see a lot of it, but I couldn't see all the way to the walls."

Okay. Based upon what he could see, you discredit his testimony, correct?

**A:** Right. Based on the information that we've

talked about, his inability to really define a pile, say if a pile is a problem, say if a pile would lead to ignition, all the other things we've talked about -- I don't know how he could say that there was -- there were no piles and that it was spread out if he doesn't know what a pile is.

**Q:** He didn't testify about piles in this section of his testimony, did he, Mr. Schumacher?

**A:** In this section, that's right.

**Q:** He testified, "I could see that the tablets had been scattered. They were all across the peanuts." That has nothing to do with what his definition of a pile is, does it?

**A:** But there is -- there are other questions related to that, and based on the application method, there had to have been piles there.

**Q:** Okay. So what he says on line 18 and 19 of page 174 of his transcript, you as the fire investigator can say, with a reasonable degree of engineering certainty, is wrong? What he saw is wrong?

**A:** That's right. His -- looking into a dark dome, based on the way they applied the tablets, all the other things that we've talked about, I disagree with his observation that there was scattering and that there were no piles.

**Q:** Even though he was there, he had a flashlight, he looked in, he saw what he saw, and -- what's the closest you've ever been to Severn, North Carolina?

MR. GOLDSTEIN: Objection.

BY MR. EPSTEIN:

**Q:** Here in Charlotte?

**A:** I don't know the answer to that.

**Q:** But you can say this man's testimony under oath is incorrect?

**A:** I can say it's inaccurate, yes.

**Q:** Okay.

**A:** You want that --

**Q:** Sure. Show you what's been marked as Exhibit 202. Take your time and look at that. That's Mr. Lilley's testimony.

**A:** Okay.

**Q:** Your testimony is there was one or more pile on the flat section of the pile directly underneath where Mr. Lilley and Mr. Turner were applying Fumitoxin tablets, correct?

**A:** Yes; as well as potentially on the slopes.

**Q:** But you're certain that directly beneath them, on the flat section as you called it, there would have been one or more piles, correct?

**A:** I think you would have concentration of tablets in the area directly below them, yes.

**Q:** Okay. Mr. Lilley testified that they had to look for a flask that fell in after their application was over, correct?

**A:** Correct.

**Q:** And they used a flashlight to try to find it, correct?

**A:** Yes.

**Q:** And he said, "Randy shined the flashlight down, and I was looking in the hole, too," correct?

**A:** Yes.

**Q:** And he was asked, "But you could see again the top of the pile and a little ways down?"

He said, "Uh-huh."

And Mr. Widis asked him, "And that's all you could see?"

He said, "Yes, sir."

And he said, "You didn't see any piling in that little area you could see; is that right?"

He said, "Yes, sir."

He was wrong when he said that; that's your testimony?

**A:** I think he's inaccurate, yes. Again, we go back to he doesn't know what piling is. He can't

describe it. He can't say it's bad. He can't say if it leads to ignition. He's looking and sees a flask, which is shiny, with a flashlight, which is different than if you have tablets in a pile of peanuts below you 20 feet. You can't -- you can only see length and width, not depth.

**Q:** Okay.

**A:** Here you go.

**Q:** How does gravity play into the analysis of what you just described, sir?

**A:** Well, it's going to cause the tablets to fall and hit the top and hit the sides. Some will stick. Some will roll. Some will collect in recessed areas.

**Q:** Do these tablets have the ability to bounce off a hard surface?

**A:** They could, but peanuts absorb it. A lot of them just go right into the peanut pile.

**Q:** From 20 to 25 feet, you think that's what's going to happen?

**A:** Yes.

**Q:** Okay. How does the angle of repose play into your analysis?

**A:** That plays into the analysis of when they hit it, they're going to either stick, they're going to roll a little bit, or they're going to bounce.

**Q:** If they're rolling or bouncing, they're not likely to wind up in a pile. Would you agree with that?

**A:** That's not necessarily true. Depends on where they're rolling to and if others are rolling to them and if they're getting caught up in a dipped area.

**Q:** Okay. Have you read Dr. Jones' expert report in this case?

**A:** Yes.

**Q:** Do you have any basis to disagree with her math that the peanuts piles -- peanut pile's surface area was at least 66,000 square feet?

**A:** I haven't done that calculation, but just assuming that it's correct.

**Q:** Okay.

**A:** That's fine.

**Q:** And do you have any reason to doubt her calculation that, placed side by side, 49,000 Fumitoxin tablets would comprise a total of 108 square feet?

**A:** I haven't done that calculation, and assuming that's correct. That's fine.

**Q:** So you've done some math in your report, and you do the division. 108 divided by 66,000 and that produces .16 percent.

**A:** That's right, but that's misleading.

**Q:** Why is that misleading?
**A:** Because you're not looking at 66,000 square feet of the peanut pile. You're going to have concentration of tablets directly below you, simply by the manner in which you apply these tablets from the flasks. And so you have to look at a much smaller surface area when you're looking at that.
**Q:** You do not conclude that piles were formed at the location where the downward sloping peanuts and upward sloping concave side walls came together, correct?
**A:** Could you have gotten a tablet there? Maybe. But I don't think you would have piles down there.
**Q:** And at least if the temperature data from August 11th were accurate, certainly those temperature data wouldn't support the notion that that's where the fire was located, correct?
**A:** Those are the -- I'd have to look at that.
**Q:** All right. If you can -- do you still have that exhibit in front of you?
**A:** Actually, I do.
**Q:** Look at cables 13 through 19. Or is it 14 through 19? I think it's 14 through 19.
**A:** Yep, it's 14 through 19.
**Q:** Okay. And those are the coolest temperatures

as of August 11th at 9:00 p.m. in the entire dome, correct?

**A:** That's right.

**Q:** So at least if those data are accurate, the notion that what caused this fire was piling of Fumitoxin tablets at the intersection of the concrete dome's walls and the surface of the peanut pile, that wouldn't support it, correct?

**A:** That's right.

**Q:** And that's not your hypothesis as to how this fire commenced, correct?

**A:** Right. That's not the area where I think the piling occurred, correct.

**Q:** Okay. You say --

**A:** Which -- where are you now?

**Q:** You're back -- back in your report. We're getting so close to the end. You have a whole paragraph devoted to Protect-It, and we were -- I saw earlier that you did some data and analysis on Protect-It. And the purpose of doing that, as you told us earlier, was to determine if there was any production of water or moisture sufficient to have caused a different reaction than would have occurred without the Protect-It, correct?

**A:** To see what the Protect-It would -- if it

could contribute to the reaction, correct.

**Q:** All right. And you know that there was 1,116 pounds of Protect-It that was taken through the conveyor and dumped into the dome that day, correct? July 1, 2009.

**A:** Yes.

**Q:** And that's five weeks before the application that we're talking about today, correct?

**A:** Yes.

**Q:** All right. What was the purpose of applying Protect-It on that day?

**A:** I think it was a precautionary measure as far as insect protection.

**Q:** What does the Protect-It do?

**A:** It's basically a diatomaceous earth with a bunch of little creatures that have -- dead creatures that have more or less sharp parts to them that the bugs, I think, walk over. And it -- it's effective against certain particular types of insects. It then basically sucks them dry of water, I guess, or something like that.

**Q:** And as we talked about earlier, the fans were running for a couple of hours to disperse and spread the Protect-It dust material across the pile of peanuts, correct?

**A:** Yes.
**Q:** And that would have led to a layer of this Protect-It dust on the surface of the peanut pile, correct?
**A:** Yes.
**Q:** Kind of like a protective glazing, something like that?
**A:** I don't know if that's the proper terminology, but you'd have a thin layer.
**Q:** Okay. Can you explain how a flash from the autoignition of phosphine gas could have ignited fine material underneath that protective layer?
**A:** Well, I mean, when you're applying the tablets, you're actually disperse -- you're moving the material that's on top of them. So you're basically coming down in a layer, and you're pushing that stuff away. So now you have more or less fresh material underneath it and near it. So you're creating a situation where you don't have that stuff like it was before. It's being moved around. It's being stirred up. And so now you have material that's available to see a flash.
**Q:** Okay. Would you agree with me that if the Protect-It layer, as you have described it, was not disturbed by the application of Fumitoxin tablets on

August 4th, 2009, a flash from the autoignition of phosphine gas could not have ignited fine material within the peanut pile?

**A:** I mean, with your hypothetical question, if you completely don't disturb it, which is -- I think that's highly unlikely, then a -- it would make the chances of a flash igniting it less likely. However, again, you have the smoldering of the tablets that it doesn't matter if you've got this fine layer; it will -- it will start the fine materials underneath it and the peanuts on fire eventually.

**Q:** So you're saying the flash may not have ignited the fine material if there was a buffer of Protect-It between the Fumitoxin tablets and the peanut pile, but eventually there would have been sufficient smoldering within the Fumitoxin pile to penetrate through the Protect-It?

**A:** That's right. And that's in your hypothetical question where you don't disturb it whatsoever.

**Q:** Before I just asked you these questions, did you even consider the effect that the Protect-It had on the ability for there to be ignition on August 4th, 2009, or thereafter?

**A:** Sure.

**Q:** Is there a reason you didn't mention that in your report?

**A:** Because I didn't think it was necessary. I didn't need to talk about it.

**Q:** But your conclusion is the mere application of the tablets would have moved the Protect-It out of the way, so to speak?

**A:** Right. You would have disturbed that -- that surface by dropping tablets from 20 or 25 feet. Absolutely.

**Q:** Okay. So the -- the gravity of 20-to-25-foot drop is sufficient to cause the Protect-It to get out of the way but insufficient to prevent there being piling; is that your testimony?

**A:** That's right. You're going to actually embed inside the peanuts, and you're going to move them. Did I say that none of them are going to -- of the tablets are going to move off the surface? No. But you're going to have a big accumulation of tablets directly below where they're applying it.

**Q:** And the Protect-It that was underneath there is going to move out of the way?

**A:** Sure. You're going -- it's not like going to instantly move left, but you're going to displace it because you're displacing the peanuts and the tablets are

taking its place. And so, yes, you're going to have movement of that material.

**Q:** How much do those tablets weigh?

**A:** Each tablets weigh three grams.

**Q:** Three grams?

**A:** Yes.

**Q:** Okay. Your last paragraph, the first sentence says, "The fire that occurred in the Severn dome was caused by the autoignition of phosphine gas which was at or above the LEL."

Where specifically did that happen?

**A:** I'm -- can you be more specific with that question? Where --

**Q:** Where within the 2-million-cubic-foot dome did the fire caused by the autoignition of phosphine gas occur?

**A:** Well, I think I've answered that. I said I can't give you the exact point of origin, but it was on the surface of the peanut pile.

**Q:** In one place? More than one place? Ten places?

**A:** At least one place. It could be more.

**Q:** Is it really your testimony that if there was one smoldering pile of Fumitoxin tablets on the surface of the peanut pile, that was going to be sufficient to

sustain a fire in a smoldering state for weeks?

**A:** Yes.

**Q:** And there never would have been a flaming fire prior to the fire suppression efforts?

**A:** I think you could have had flaming combustion going on there, but you had smoldering initially. It could have been flaming some point, changed from flaming to smoldering and flaming in that environment, but eventually it would be a smoldering fire.

**Q:** Based upon your education, training, and experience, if a fire results from the self-heating of a commodity, spontaneous combustion, is that a fire which develops slowly or quickly?

**A:** Read that question one more time, please.

**Q:** Sure. Based upon your education, training, and experience, if a fire results from self-heating of a commodity to spontaneous combustion, is that a -- is that fire typically one which develops slowly or quickly?

**A:** I mean, it depends on the pile size. It depends on a lot of things. But generally relatively slowly.

**Q:** Would you not agree, Mr. Schumacher, that the type of fire you describe at the bottom of page 13 in your report is more consistent with a fire caused by self-heating and spontaneous combustion than with the

autoignition of a gas that has reached its lower flammable limit?

**A:** No.

**Q:** You don't agree with that?

**A:** No.

**Q:** And you've testified that this fire commenced within the first two to three days after the application, correct?

**A:** Yes; something like that.

**Q:** And if there wasn't smoke detected until the seventh day, how do you explain that?

**A:** Simply. It's a very, very tight dome. It's sealed, and it's made to be insulated. And so I'm not surprised it wasn't noticed for that amount of time.

**Q:** Are there any people with whom you have discussed this case, other than the lawyers for the plaintiffs, that we haven't already discussed or gone over today?

**A:** Besides Jay Freeman, who is my partner.

**Q:** Okay. What have you discussed with Jay Freeman, your partner?

**A:** Just the case in general, sounding-board-type things. But besides that, not much. Zach Jason helped do some of that work that you've seen.

**Q:** No one else other than other engineers in

your firm, the lawyers in this case, and the experts in this case?

**A:** That's right.

**Q:** Okay. All right. Have we discussed any and all disagreements or criticisms you have of the opinions expressed by Mr. Ryman in this case?

**A:** Well, I mean, can you -- that's a --

**Q:** Is there anything that stands out in your mind that Mr. Ryman says with which you disagree that you haven't already discussed with me today?

**A:** And I'm going to give you what I can think about --

**Q:** Sure.

**A:** -- but I'm not going to say it's all-encompassing.

**Q:** Understood.

**A:** Well, the biggest thing is -- well, no, actually. He says that this can happen. I mean --

**Q:** I'm talking about disagreements.

**A:** Yeah. And I'd have to look at his report and stuff that -- well, I disagree that you can't confine the phosphine, that kind of thing. So his discussions about, you know, the label, that it doesn't really happen, those kind of things I would disagree with.

**Q:** Okay. Dr. Mann -- "Dr. Mann."

Mr. Mann; are there things that you disagree with from his report that you haven't already expressed today that can come to your mind readily?

**A:** Besides the fact that he doesn't think this can happen. I mean, the obvious things were he and I disagree with opinions.

**Q:** Do you agree with his protocol or methodology on how he did his testing?

**A:** Well, I mean, he did spot measurements as opposed to constant sampling, and why he did -- why he chose to take a measurement at one time and not sooner or more periodically, that may have changed the concentrations that he was getting when he was doing that sampling. I know he did a GC mass spec analysis, and so he had to do spot measuring. But why he chose the times to measure, I don't know why. Why he stopped at a hundred, I don't know why. And so things like that, you know, I question.

**Q:** Is there anything about his methodology as you read it in his report -- first of all, have you analyzed the file data from Mr. Mann?

**A:** What file data? Like --

**Q:** The file data showing the actual concentration of phosphine gas at every interval he measured it, the file data showing the actual temperature

of the commodity and just aside the commodity at every interval he measured it. Have you seen all those data?

**A:** I've seen what's in his report, yes.

**Q:** Well, have you not seen the file material that supports what's in his report?

**A:** I'm trying to think if I have. I don't know if I've seen the specific file material. I've seen what's in his report as far as those concentrations.

**Q:** Okay. Is there anything about his methodology or protocol or the way he analyzed the information that made you think this is a man who is trying to get to a certain result and will do what he needs to do to get that result?

**A:** Well, again, I think stopping at a hundred tablets, I question why that was done in this case; why he didn't go to 200 tablets, for instance. So in that regard, yes, I question that.

**Q:** And if he went to 200 tablets, would you be criticizing him for not going to 300 tablets?

**A:** I have no idea. I want to -- I want to see a progression, because he's showing a progression of an increase in the phosphine concentration, one that is very near the lower flammable limited with a hundred tablets.

**Q:** Anything else that comes to mind about Doc-

-- about Mr. Mann's report that you would disagree with?

**A:** I mean, I can't think of specifics. Again, I would have to spend time looking at the report. But anything where he says it can't happen and -- I disagree with.

**Q:** Okay. Let's move on to Dr. Montross. Let me ask you first: Were you supplied all of the backup data on the modeling that Dr. Montross did?

**A:** Yes.

**Q:** Okay. Did you have a chance to review that?

**A:** I looked at it briefly. Some of the files I could not open. I don't know what program he was using.

**Q:** Right.

**A:** And so, in that sense, I can't look at that data.

**Q:** Well, let me ask you the same question about Dr. Montross that I asked you about Mr. Mann. Is there anything you saw from his backup data, from his report, from his analysis, that makes you believe that Dr. Montross was essentially trying to get to a certain result and did what he had to, to get there?

**A:** Well, I mean, his model. He picks a certain number of peanuts and then models it using whatever

model -- the dry mass -- dry matter loss model. But, I mean, I can't say he was trying to get to a certain spot, if that's what you're asking. I mean, I don't know how to answer that question.

**Q:** Did you understand the entirety of his report?

**A:** Yes. I understood the majority of it, sure.

**Q:** And are there con- -- you've already told me about a couple of significant things, the BTUs in particular. Is there a concept that he described about his analysis with which you disagreed with his description? Whether it was dry matter loss, whether it was spontaneous combustion, whether it was the degree to which moisture plays a role in spontaneous heating. Any concept that he discussed with which you disagree?

**A:** Well, just his ability to take the temperatures of his model and say that that's going to result in ignition of the peanuts from self-heating to ignition I disagree with.

**Q:** Okay. Anything else that comes to mind?

**A:** I mean, it's a big report.

**Q:** Okay. I'll get to a smaller one. Rodney Nohr; did you have a chance to review his report?

**A:** That's the one I think I was unsure of if I

looked at or not.

**Q:** Okay. I thought that was Sean O'Keefe.

**A:** Okay. That's right.

**Q:** Rodney Nohr, in fact, talked about spontaneous combustion.

**A:** Right. I think I did look at it. I'd have to review it again because it's been a while.

**Q:** Okay. David South, the very short report; is there anything that you looked at in that report with which you disagreed?

**A:** I think there would be some temperature variations, but in general, I'm not sure I disagree with the concept.

**Q:** Okay. We haven't talked at all about John Walker, and I do want to give you his report, which we'll mark as Exhibit 278.

MR. EPSTEIN: Do you need a copy?

[EXHIBIT NO. 278 MARKED FOR IDENTIFICATION]

BY MR. EPSTEIN:

**Q:** I take it you have had a chance to review his report since he's the only origin and cause investigator that we have designated, correct?

**A:** Yes.

**Q:** All right. And I take it you paid particular

attention to this report when you went through it, correct?

**A:** Well, I read it, sure.

**Q:** Okay. And take whatever time you need, but I'd like for you to tell me what in his report that you believe is material to either his opinions or yours you disagree with.

**A:** Well, I mean, if you go to page 34 where he talks about the fire results on the surface of the peanuts, it should be flaming. I mean, I think it's initially going to be smoldering. And as I've talked about, it could transition to flaming, but in the end, it will be smoldering once you get there -- you get to August 11th. So in that sense, I disagree with his discussion about a fire on the surface.

**Q:** Did you say that there was flaming combustion on August 11th?

**A:** No. I said by the time you come to August 11th, it would be smoldering.

**Q:** Okay.

**A:** Yes. I didn't intend to say that. I hope I didn't say that.

**Q:** Okay. No. I think I was zoning out.

Go ahead.

**A:** That happens late in the game, doesn't it?

And then he's -- again, he's relying a lot -- a lot of this stuff is relying on the temperature cables as of August 11th, which again I pointed out how they appear to be unreliable, how Scott Chant's talked about that. And so a lot of these discussions he's having is related to these temperature cable readings.

**Q:** Okay.

**A:** And so, I mean, that's something to point out. And this is a big report; so it's -- I'm just trying to --

**Q:** Sure.

**A:** -- go through it so we're not here forever.

Well, he talks about -- on page 48, he says, "As previously discussed, circumstance and evidence in this matter were consistent with self-heating and spontaneous combustion ignition inside the pile of peanuts." I disagree with that.

**Q:** Is the SFPE handbook on fire protection engineering one of the sources that you testified earlier you found to be authoritative?

**A:** Yes.

**Q:** Okay. And Kirk's Fire Investigation is as well, correct?

**A:** Yes.

**Q:** Okay.

**A:** Page 49, "Testing conducted by MDE Labs did not support the ignition hypothesis opined by the plaintiff's experts." I don't think that's correct. And again, it's a limited number of tablets in that situation. And so just because you don't get ignition or the LFL with that doesn't mean it doesn't happen.

**Q:** Okay.

**A:** His hypothesis of the origin was that it was deep in the pile, not in the surface. I disagree with that; not that that is a hypothesis, but that that occurred.

And then, again, I disagree that -- he's determined it's spontaneous combustion versus the Fumitoxin application.

And then his -- on page 57, he talks about my report and saying that the same basis -- that there's no scientific foundation, et cetera, I obviously disagree with that. And I would disagree with his conclusions.

**Q:** Okay.

**A:** So that's as quick as I can do it without going through it.

**Q:** Okay. I appreciate you doing that. She's going to need that.

**A:** Yep.

**Q:** And I've just got some closing questions, and

then Mr. Goldstein may have some additional questions.

Well, let me ask first if anything -- did you review Dr. Carol Jones' report?

**A:** Yes, I did. I mean, she talked about the 66,000 square feet, correct?

**Q:** Yes. You disagree with her analysis of that.

**A:** Right.

**Q:** Apart from that, I know most of what she talked about were best practices in the storage of agricultural commodities. And do you have any opinions regarding her statements on those issues: best practices regarding agricultural commodities?

**A:** No.

**Q:** Okay. And to the extent that she testified that the method of application by Brian Lilley and Randy Turner was appropriate, that's really not your bailiwick because you're not a certified applicator, correct?

**A:** That's right.

**Q:** Okay. So you're --

**A:** I'm not addressing those issues.

**Q:** The only issue that you are addressing that intersects with what she addressed was on the piling of Fumitoxin tablets, and you've already expressed your opinions about that, correct?

**A:** Well, and then she said, I think, something

to the effect you can't pile, you wouldn't pile, et cetera. So I disagree with that.

**Q:** And she did some testing, and apparently you have done some testing with Lester Rich and John Mueller. And there may come a day where we talk further about that?

**A:** Right.

**Q:** Okay. Now, closing questions --

**A:** Now, her testing was done with the dummy tablets --

**Q:** Correct.

**A:** -- not the real stuff, so that's -- that's one difference.

**Q:** It didn't smell as bad when she was doing it.

**A:** Well, I mean, that's certainly one of them. And they appear to -- apparently they're slicker and they're lighter, et cetera.

**Q:** All right. My guess is Mr. Widis or Mr. Goldstein will ask her questions about that.

**A:** I'm sure.

**Q:** All right. Mr. Schumacher, over the course of the seven or so hours that you have testified today, have you expressed every opinion you intend to express at the trial of this action, save for the testing that you did in Memphis, Tennessee, on September 4th, 2013?

**A:** I think so, yes.

**Q:** Have you told me -- again, with that one exception, have you told me about every basis you have for your opinions?

**A:** Besides what's in my report and -- yes, I think that's correct.

**Q:** Is there any other work you intend to perform in relation to this matter between now and the time of this trial?

**A:** Well, I -- I'm certain I'll be reviewing other depositions --

**Q:** Uh-huh.

**A:** -- and other testimony in this case, and what that will mean, I don't know.

**Q:** But for instance, you have no intention of now engaging a certified laboratory to perform testing of the type done by Dale Mann?

**A:** That's right.

**Q:** Okay. On page 1 of your report, you stated that -- well, I might have the wrong page, but I think somewhere you state that, if necessary, you might do additional reports. You've already done two supplemental reports. You have no intention of doing any others, do you?

**A:** Well, at this time, that's right; I don't.

**Q:** Okay. And the sole purpose that you produced those supplemental reports was to provide additional bases for the opinions expressed in your report, correct?

**A:** Well, I mean, that's one of the things, sure.

**Q:** Have you reviewed any additional information since April 30th, 2013, that you would consider significant enough to change any of the conclusions you expressed in your report?

**A:** No.

**Q:** Have you reviewed any additional information since April 30th, 2013, you would consider significant enough to alter -- to alter anything you expressed in your report?

**A:** No, I don't think so.

**Q:** Might have a little -- a couple little nits that I picked out where you might have missed something like the July 13th temperatures and the timeline or the actual dates when the loading or -- of the dome began or when it was completed. But apart from that, you're comfortable with everything in your report?

**A:** Yes. And thank you for pointing those out.

**Q:** You're welcome.

**A:** I appreciate that.

**Q:** During your preparation for your deposition, did you see anything that you included in your report that in hindsight you believe should not be in your report?

**A:** No.

**Q:** During your preparation for your deposition, did you see anything that you omitted in your report that you believe should be in your report?

**A:** No.

MR. EPSTEIN: I'm going to pass you along to Mr. Goldstein. Thank you.

CROSS EXAMINATION

BY MR. GOLDSTEIN:

**Q:** Hi, Mr. Schumacher. We're just going to take a few minutes, and then you'll, hopefully, get out of here.

I just want to go back to two exhibits that Mr. Epstein had used. Exhibit 276, that's the article that Mr. Brown and a colleague of his -- or Dr. Brown and a colleague of his had prepared?

**A:** Yes.

**Q:** If you could turn to page 3.

**A:** Okay.

**Q:** And there's a paragraph that says, "How do I apply the fumigant?" Do you see that?

**A:** Yes.
**Q:** And can you read the last sentence of that paragraph.
**A:** It says, "Too much aluminum phosphide in any one spot can lead to fires and explosion."
**Q:** There's no mention of the need for contact with liquid water in that sentence, is there?
**A:** That's correct.
**Q:** And then one last exhibit, the MSDS, 275.
**A:** Yes.
**Q:** And again, I think you told us you don't know if this is exactly the MSDS that you saw. The first page, there's a date, date of revision.
Do you see that?
**A:** If you could point it to me.
**Q:** Yeah, it's right there.
**A:** Oh, yeah. March 2011.
**Q:** Well, that's two years after this incident, correct?
**A:** Yes.
**Q:** So we don't know whether the one that was in existence at the time of the fumigation was identical to this one, do we?
**A:** That's right.
**Q:** Okay. But go to the last page. And there's

a section -- you see that "Other Precautions"?
**A:** Yes.
**Q:** And then -- and read No. 2.
**A:** "Do not pile up large quantities of Fumitoxin during fumigation or disposal."
**Q:** Okay. And that's similar to what's in the applicator's manual, correct?
**A:** Yes.
**Q:** And then read No. 4.
**A:** "Open containers of Fumitoxin only in open air. Do not open in flammable atmosphere. Phosphine, hydrogen phosphide, PH3, in the head space of containers may flash upon exposure to atmospheric oxygen."
**Q:** Okay. And is it your understanding that that flash that it's warning may occur would occur without exposure to liquid water?
**A:** Yes.
**Q:** And that warning is also within the manual, correct?
**A:** Yes.
**Q:** And the manual's considered a matter of federal law, correct?
**A:** That's my understanding, yes.
MR. GOLDSTEIN: That's all I have. Thanks.

MR. EPSTEIN: All right. We're done. I'm going to give this to you, because next week, when you do Dale Mann, you'll remember we're on 279.

MR. GOLDSTEIN: Yes. Thank you.

THE VIDEOGRAPHER: Off the record at 6:20.

[WITNESS DISMISSED AT 6:20 P.M.]

I have read the foregoing pages which contain a correct transcription of the answers given by me to the questions herein recorded.  My signature is subject to corrections on the attached errata sheet, if any.

Signed this _____ day of _______________, _______.

________________________

JOHN L. SCHUMACHER, P.E.

STATE OF __________________

COUNTY OF _________________

Subscribed and sworn to before me this _______ day of ___________________, ________.

___________________

Notary Public

My commission expires:

______________________

STATE OF NORTH CAROLINA

COUNTY OF WAKE

C E R T I F I C A T E

I, Susan S. Burgess, notary public/court reporter, do hereby certify that the above-named was duly sworn or affirmed prior to the taking of the foregoing deposition; and that said deposition was taken and transcribed under my supervision; and that the foregoing pages, inclusive, constitute a true and accurate transcription of the testimony of the witness.

I do further certify that the persons were present as stated in the caption.

I do further certify that I am not of counsel for or in the employment of either of the parties to this action, nor am I interested in the results of this action.

This is the 26th day of September, 2013.

Notary Public #200530000115

# MATERIAL SAFETY DATA SHEET: ALUMINUM PHOSPHIDE

| | U.S. EPA Reg. No. | Canada Reg. No. |
|---|---|---|
| FUMITOXIN® TABLETS | 72959-1 | 19227 |
| FUMITOXIN® PELLETS | 72959-2 | 19226 |

**PROPER DOT SHIPPING NAME: ALUMINUM PHOSPHIDE, 4.3 (6.1) UN1397 PG I DANGEROUS WHEN WET, POISON LABELS APPLY**

## SECTION I - PRODUCT INFORMATION

**Manufacturer:**

D & D Holdings
153 Triangle Dr.
P. O. Box 116
Weyers Cave, VA 24486 USA

Telephone: (540) 234-9281 / 1-800-330-2525
Telefax: (540) 234-8225 / 1-800-548-2778
Internet Address: www.degeschamerica.com
E-mail: degesch@degeschamerica.com

**EMERGENCY TELEPHONE NOS.:**

Emergency – Call PROSAR: 1-800-308-4856 for human or animal emergencies
Call Chemtrec: 1-800- 424-9300 for all other chemical emergencies
Emergency and Information - DEGESCH America, Inc. (540) 234-9281 / 1-800-330-2525
Pestcon Systems, Inc. (252) 237-7923 / 1-800-548-2778

Fumitoxin tablets and pellets are available as 0.6g pellets and 3.0g tablets.

Date of Revision: March 2011

## SECTION II - HAZARDOUS INGREDIENTS INFORMATION

**Identity:**

Fumitoxin and Aluminum Phosphide (AlP) - react with water to produce phosphine (hydrogen phosphide, $PH_3$) as shown in Equation 1. Fumitoxin is formulated with 55% aluminum phosphide and also contains ammonium carbamate (AC) and inert ingredients. Ammonium carbamate releases ammonia and carbon dioxide as shown in Equation 2.

1) $AlP + 3H_2O \dashrightarrow Al(OH)_3 + PH_3$ 2) $NH_2COONH_4 \dashrightarrow 2NH_3 + CO_2$

| | | | |
|---|---|---|---|
| AlP | CAS No. 20859-73-8 | $NH_2COONH_4$ | CAS No. 1111-78-0 |
| $PH_3$ | CAS No. 7803-51-2 | $NH_3$ | CAS No. 7664-41-7 |
| $Al(OH)_3$ | CAS No. 21645-51-2 | $CO_2$ | CAS No. 124-38-9 |

**NFPA Chemical Hazard Ratings:**
Flammability Hazard 4
Health Hazard 4
Reactivity Hazard 2
Special Hazard ~~W~~

**SARA Physical and Health Hazards:**
Fire
Reactivity
Immediate (Acute)

**Inhalation Exposure Limits:**

| Component | OSHA PEL | ACGIH TLV | | NIOSH |
|---|---|---|---|---|
| | TWA (ppm) | TWA (ppm) | STEL (ppm) | IDLH (ppm) |
| Phosphine (Hydrogen Phosphide, $PH_3$) | 0.3 | 0.3 | 1.0 | 50 |
| Ammonia | 50 | 25 | 35 | 300 |
| Carbon Dioxide | 5,000 | 5,000 | 30,000 | 40,000 |

## SECTION III - PHYSICAL CHARACTERISTICS

**Boiling Point:**
AlP >1000°C
$PH_3$ -87.7°C

**Specific Gravity of Vapors (Air = 1):**
AlP N/A
$PH_3$ 1.17

**Vapor Pressure:**
AlP 0mm Hg
$PH_3$ 40mm Hg @ 129.4°C
AC 100mmHg @ 26.7°C

**Solubility in Water:**
AlP Insoluble, reacts
$PH_3$ 26cc in 100 ml water at 17°C
AC Very soluble, reacts

EXHIBIT
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Schumacher

**Appearance and Odor:**
Fumitoxin and aluminum phosphide have a greenish-gray color and the phosphine (hydrogen phosphide, $PH_3$) gas produced by these chemicals has an odor described as similar to garlic, carbide or decaying fish.

| **Specific Gravity:** | | **Melting Point:** | |
|---|---|---|---|
| AlP | 2.85 | AlP | >1000°C |
| | | $PH_3$ | -133.5°C |

## SECTION IV - FIRE AND EXPLOSION HAZARD DATA

**Flash Point:**
Aluminum phosphide and Fumitoxin are not themselves flammable. However, they react readily with water to produce phosphine (hydrogen phosphide, $PH_3$) gas which may ignite spontaneously in air at concentrations above its LEL of 1.8% v/v (18,000 ppm). UEL of phosphine (hydrogen phosphide, $PH_3$) is not known.

**Extinguishing Media:**
Suffocate flames with sand, carbon dioxide or dry extinguishing chemicals.
**Special Fire Fighting Procedures:**
Do not use water on metal phosphide fires.

**Respiratory Protection:**
Wear NIOSH/MSHA approved SCBA or equivalent respiratory protection.

**Protective Clothing:**
Wear gloves when handling Fumitoxin tablets, pellets or dust.

**Unusual Fire and Explosion Hazards:**
Phosphine (hydrogen phosphide, $PH_3$) -air mixtures at concentrations above the lower flammable limit of 1.8% v/v (18,000 ppm). Phosphine (hydrogen phosphide, $PH_3$) may ignite spontaneously. Ignition of high concentrations of phosphine (hydrogen phosphide, $PH_3$) can produce a very energetic reaction. Explosions can occur under these conditions and may cause severe personal injury. Never allow the buildup of phosphine (hydrogen phosphide, $PH_3$) to exceed explosive concentrations. Open containers of metal phosphides in open air only and never in a flammable atmosphere. Do not confine spent or partially spent dust from metal phosphide fumigants as the slow release of phosphine (hydrogen phosphide, $PH_3$) from these materials may result in the formation of an explosive atmosphere. Spontaneous ignition may occur if large quantities of aluminum phosphide or magnesium phosphide are piled in contact with liquid water. This is particularly true if quantities of these materials are placed in in an environment (i.e., moist or spoiled grain) which can provide partial confinement of the phosphine (hydrogen phosphide, $PH_3$) gas liberated by hydrolysis.

Fires containing phosphine (hydrogen phosphide, $PH_3$) or metal phosphides will produce phosphoric acid by the following reaction:

$$2PH_3 + 4O_2 \dashrightarrow 3H_2O + P_2O_5 \dashrightarrow 2H_3PO_4$$

## SECTION V - REACTIVITY DATA

**Stability:**
Fumitoxin and aluminum phosphide are stable to most chemical reactions, except for hydrolysis. They will react with moist air, liquid water, acids and some other liquids to produce toxic and flammable phosphine (hydrogen phosphide, $PH_3$) gas. Phosphine (hydrogen phosphide, $PH_3$) may react vigorously with oxygen and other oxidizing agents.

**Incompatibility:**
Avoid contact with water and oxidizing agents.
**Corrosion:**
Phosphine (hydrogen phosphide, $PH_3$) gas may react with certain metals and cause corrosion, especially at higher temperatures and relative humidities. Metals such as copper, brass and other copper alloys, and precious metals such as gold and silver are susceptible to corrosion by phosphine. Small electric motors, smoke detectors, brass sprinkler heads, batteries and battery chargers, fork lifts, temperature monitoring systems, switching gears, communication devices, computers, calculators and other electrical equipment may be damaged by this gas. Phosphine (hydrogen phosphide, $PH_3$) will also react with certain metallic salts and, therefore, sensitive items such as photographic film, some inorganic pigments, etc., should not be exposed.

**Hazardous Polymerization:**
Will not occur.

## SECTION VI - HEALTH HAZARD INFORMATION

**Routes of Entry:**
The dermal toxicity of aluminum phosphide is very low. The LD50 via the dermal route is greater than 5,000 mg per kilogram for a 1-hour exposure. Primary routes of exposure are inhalation and ingestion.

**Acute and Chronic Health Hazards:**
Fumitoxin and aluminum phosphide are highly acute toxic substances. The LC50 for phosphine (hydrogen phosphide, $PH_3$) gas is about 180 ppm for a one-hour inhalation exposure. The acute oral toxicity of the Fumitoxin formulations was found to be 11.5 mg/kg of body weight. Aluminum phosphide and phosphine (hydrogen phosphide, $PH_3$) are not known to cause chronic poisoning.
**Carcinogenicity:**
Aluminum phosphide and phosphine (hydrogen phosphide, $PH_3$)are not carcinogenic and are not listed as such by NTP, IARC or OSHA.

**Signs and Symptoms of Exposure:**

Aluminum phosphide tablets, pellets, and dust react with moisture from the air, acids and many other liquids to release hydrogen phosphide (phosphine, PH3) gas. Mild exposure by inhalation causes malaise (indefinite feeling of sickness), ringing in the ears, fatigue, nausea and pressure in the chest which is relieved by removal to fresh air. Moderate poisoning causes weakness, vomiting, pain just above the stomach, chest pain, diarrhea and dyspnea (difficulty in breathing). Symptoms of severe poisoning may occur within a few hours to several days resulting in pulmonary edema (fluid in lungs) and may lead to dizziness, cyanosis (blue or purple skin color), unconsciousness, and death.

**Emergency and First Aid Procedures:**

Symptoms of overexposure are headache, dizziness, nausea, difficult breathing, vomiting, and diarrhea. In all cases of overexposure get medical attention immediately. Take victim to a doctor or emergency treatment facility.

**If the gas or dust from aluminum phosphide is inhaled:**
Get exposed person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth to mouth, if possible. Contact a poison control center or doctor for treatment advice.

**If aluminum phosphide pellets, tablets or powder are swallowed:**
Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not give anything by mouth to an unconscious person. Do not induce vomiting unless told to by a poison control center or doctor.

**If powder or granules of aluminum phosphide get on skin or clothing:**
Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

**If dust from pellets or tablets gets in eyes:**
Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

**HOTLINE NUMBER:** Have the product container, label or applicator's manual with you when calling a poison control center, doctor, or when going for treatment. CONTACT 1-800-308-4856 FOR ASSISTANCE WITH HUMAN OR ANIMAL MEDICAL EMERGENCIES. You may also contact Degesch America, Inc. (540) 234-9281 / 1-800-330-2525 or Pestcon Systems, Inc. (252) 237-7923 / 1-800-548-2778 OR CHEMTREC 1-800-424-9300 for all other chemical emergencies.

## SECTION VII - PRECAUTIONS FOR SAFE HANDLING

**Spill Cleanup Procedures:**

If possible, dispose of spilled Fumitoxin by use according to label instructions. Freshly spilled material which has not been contaminated by water or foreign matter may be replaced into original containers. Punctured flasks or containers may be temporarily repaired using aluminum tape. If the age of the spill is unknown or if the product has been contaminated with soil, debris, water, etc., gather up the spillage in small open buckets having a capacity no larger than about 1 gallon. Do not add more than about 1 to 1.5kg (2 to 3 lbs.) to a bucket. If on-site wet deactivation is not feasible, transport the uncovered buckets in open vehicles to a suitable area. Wear gloves when handling Fumitoxin tablets and pellets.

Respiratory protection may be required during cleanup of spilled material. If the concentration of phosphine (hydrogen phosphide, $PH_3$) is unknown, NIOSH/MSHA approved SCBA or its equivalent must be worn.

Small amounts of spillage, from about 4 to 8 kg (9 to 18 lbs.) may be spread out over the ground in an open area to be deactivated by atmospheric moisture. Alternatively, spilled Fumitoxin may be deactivated by the wet method as described in the following:

**Wet Deactivation of Spilled Fumitoxin:**

1. Deactivating solution is prepared by adding the appropriate amount of low sudsing detergent to water in a drum or other suitable container. A 2% solution or 4 cups of detergent in 30 gallons is suggested. The container should be filled with deactivating solution to within a few inches of the top.
2. The material is added slowly to the deactivating solution and stirred so as to thoroughly wet all of the product. This should be carried out in open air and respiratory protection may be required. At no time should the deactivation drum be covered.
3. No more than about 45 to 50 lbs. of Fumitoxin should be added to 15 gallons of water-detergent mixture. Add weights or otherwise ensure that Fumitoxin stays submerged until deactivation is completed.
4. Allow the mixture to stand, with occasional stirring, for about 36 hours. The resultant slurry of dust or packaged product will then be safe for disposal.
5. Dispose of the slurry of deactivated material, with or without preliminary decanting, at a sanitary landfill or other suitable site approved by local authorities. Where permissible, this slurry may be poured into a storm sewer or out onto the ground.

**For Assistance:**

Contact - D & D Holdings
Telephone: (540) 234-9281 / (800) 330-2525
Fax: (540) 234-8225
Internet address: www.degeschamerica.com
E-Mail: degesch@degeschamerica.com

or

Human or Animal Emergencies – PROSAR: 1-800-308-4856
All other chemical emergencies – CHEMTREC: 1-800-424-9300

**Disposal of Spent Fumitoxin:**

When being disposed of, spilled or partially reacted Fumitoxin is considered hazardous wastes under existing Federal Regulations. If properly exposed, the grayish-white residual dust after a fumigation will not be a hazardous waste and normally contains only a very small amount of unreacted aluminum phosphide. This waste will be safe for disposal. However, the spent residual dust from incompletely exposed Fumitoxin may require special care.

Triple rinse tablet and pellet flasks and stoppers with water. Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities. Rinsate may be disposed of in a storm sewer, sanitary landfill or by other approved procedures. Or, it is permissible to remove lids and expose empty flasks to atmospheric conditions until the residue in the flasks is reacted. Then puncture and dispose of in a sanitary landfill or other approved site, or by other procedures approved by state and local authorities.

Some local and state waste disposal regulations may vary from the following recommendations. Disposal procedures should be reviewed with appropriate authorities to ensure compliance with local regulations. Contact your State Pesticide or Environmental Control Agency or Hazardous Waste Specialist at the nearest EPA Regional Office for guidance.

1. Confinement of partially spent residual materials, as in a closed container, or collection and storage of large quantities of dust may result in a fire or explosion hazard. Small amounts of hydrogen phosphide may be given off from unreacted aluminum phosphide, and confinement of the gas may result in a flash.
2. In open areas, small amounts of spent residual dust or spent packaged products may be disposed of on site by burial or by spreading over the land surface away from inhabited buildings.
3. Residual dust from Fumitoxin may also be collected and disposed of at a sanitary landfill, or other approved sites or by other procedures approved by Federal, State or Local authorities.
4. From 3 to 5 kg (7 to 10 lbs.) of spent dust from 2 to 3 flasks of Fumitoxin may be collected for disposal in a 1-gallon bucket. Larger amounts, up to about one-half case, may be collected in burlap, cotton or other types of porous cloth bags for transportation in an open vehicle to the disposal site. Do not collect dust from more than 7 flasks of tablets, 10 flasks of pellets (about 11 kg or 25 lbs.) in a single bag. Do not pile cloth bags together. Do not use this method for partially spent or "green" dust. Caution: Do not collect dust in large drums, dumpsters, plastic bags or other containers where confinement may occur.

**Precautions to be Taken in Handling and Storage:**

Store Fumitoxin products in a locked, dry, well-ventilated area away from heat. Post as a pesticide storage area. Do not store in buildings inhabited by humans or domestic animals.

**Other Precautions:**

1. Do not allow water or other liquids to contact Fumitoxin tablets, pellets or their dust.
2. Do not pile up large quantities of Fumitoxin during fumigation or disposal.
3. Once exposed, do not confine Fumitoxin or allow phosphine (hydrogen phosphide, $PH_3$) concentrations to exceed the LEL.
4. Open containers of Fumitoxin only in open air. Do not open in a flammable atmosphere. Phosphine (hydrogen phosphide, $PH_3$) in the head space of containers may flash upon exposure to atmospheric oxygen.
5. Fumitoxin tablets and pellets are restricted use pesticides due to acute inhalation toxicity of highly toxic phosphine (hydrogen phosphide, $PH_3$) gas. For retail sale to and use only by certified applicators or persons under their direct supervision and only for those uses covered by the certified applicator's certification.
6. See EPA approved labeling for additional precautions and directions for use.

## SECTION VIII - CONTROL MEASURES

**Respiratory Protection:**

NIOSH/MSHA approved full-face mask with approved canister for phosphine (hydrogen phosphide, $PH_3$) may be worn at concentrations up to 15 ppm. At levels above this or when the phosphine (hydrogen phosphide, $PH_3$) concentration is unknown, NIOSH/MSHA approved SCBA or equivalent must be worn.

**Protective Clothing:**

Wear gloves when contact with aluminum phosphide tablets, pellets or dust is likely to occur.

**Eye Protection:**

None required.

**Ventilation:**

Local ventilation is generally adequate to reduce phosphine (hydrogen phosphide, $PH_3$) levels in fumigated areas to below the TLV/TWA. Exhaust fans may be used to speed the aeration of silos, warehouses, shipholds, containers, etc.

**We believe the statements, technical information and recommendations contained herein are reliable, but they are given without warranty or guarantee of any kind, expressed or implied, and we assume no responsibility for any loss, damage, or expense, direct or consequential, arising out of their use.**

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EXHIBIT 276 Schumacher

PENGAD 800-631-6989

# Fumigating Agricultural Commodities With Phosphine

Various ways are used to prevent insects from attacking stored products. Once insects get into a stored product, however, few practical solutions are available for getting rid of them. Small amounts of products can be frozen, or heated, to kill the insects. Large quantities need to be fumigated. This publication presents information about using phosphine fumigants to control insect infestations in stored agricultural commodities.

Phosphine fumigants are sold in solid form, either as aluminum phosphide or magnesium phosphide. This publication focuses on aluminum phosphide that is sold under various brand names including Phostoxin, Phosfume, and Weevilcide. Aluminum phosphide can be used to eliminate insect infestations in a variety of commodities, including animal feed and feed ingredients, corn, cottonseed, grass seed, millet, oats, peanuts, pecans, popcorn, rye, sorghum, soybeans, triticale, and wheat. They can also be used for a variety of processed foods as long as the residue dust does not come in direct contact with the product. They can be used on some nonfood commodities including straw and hay, cotton, feathers, tobacco, dried plants and flowers, and seeds. The fumigant label contains a complete list of commodities that can be fumigated. Phosphine fumigants can be used in a variety of structures including grain bins and silos, rail cars, warehouses, and flat storage structures.

When the solid fumigant is exposed to water vapor in the air, a chemical reaction occurs releasing phosphine gas (hydrogen phosphide) and heat:

Aluminum phosphide + Water = Phosphine gas + Aluminum hydroxide + heat

$AlP + 3H_2O = PH_3 + Al(OH)_3 + \text{heat}$

The breakdown of the solid fumigant starts slowly, gradually accelerates, and then tapers off. When the chemical reaction has finished, all that is left is a nonhazardous gray powder consisting of aluminum hydroxide and other inert materials.

Phosphine gas is highly toxic, reactive, and potentially explosive. Because of the dangers associated with their use, phosphine fumigants are restricted-use pesticides that can be used only by trained and certified applicators in accordance with label instructions. Farmers who have a private applicator's license can apply phosphine fumigants on their farms.

An effective fumigation requires that the phosphine gas be held in the infested structure long enough to kill the target pests. After fumigation, the gas must be vented to the legal level for human exposure. These requirements are constant regardless of the structure involved; however, different types of structures may require different application procedures and safety considerations.

When you purchase a phosphine fumigant, be sure to ask for the applicator's manual, which is legally part of the fumigant label. The manual contains information needed to perform a safe, effective, and legal fumigation procedure. Read and follow all instructions on the container label and in the applicator's manual. Remember that the label, including the applicator's manual, is the law. This publication is not a substitute for the applicator's manual. It is meant to be an overview of the process of fumigation.

## Frequently asked questions about aluminum phosphide:

### *Why should I read the applicator's manual?*

- Your safety and the safety of others depend on it. Deaths have occurred from using the product improperly.
- Fumigations too often fail because the fumigant isn't applied correctly. This is a waste of time, money, and effort.
- The label is the law, and the applicator's manual is part of the label.

### *What is a fumigation management plan?*

This is a written plan that summarizes all the steps that will be taken before, during, and after the fumigation. It makes sure that the fumigant is applied effectively and safely by forcing you to think about all the steps beforehand. The applicator's manual explains what has to be in the plan: you must document who, what, when, where, how, and why. For example, who should be told about the fumigation because they might be accidentally exposed to phosphine gas during the fumigation, or who should be notified in case of emergency. Include the phone numbers of the nearest fire department, police department,

hospital, and your physician. Also, who will conduct the fumigation? What commodity will be fumigated? What type of structure will be fumigated? Can it be sealed? If not, it shouldn't be fumigated. When will you begin the fumigation, and when will you end the fumigation? When will it be safe to use the commodity? Describe the characteristics of the site, including a sketch. Indicate places where people might be accidentally exposed to phosphine gas. Think about where phosphine gas can escape and where you need to seal potential leaks. How will the structure be sealed? How will accidental exposure be prevented? How will you monitor gas concentrations? How will you apply the aluminum phosphide pellets or tablets? How will you aerate the structure? Why was the fumigation necessary?

### *Do I have to prepare a fumigation management plan?*

Yes, unless you have some old product that came with the old (pre-2004) label. The plan needs to be kept on file for at least 2 years.

### *Why should I seal the structure?*

- If you don't, the gas will probably leak before it reaches a high enough concentration to kill all the insects.
- Unsealed or poorly sealed structures are safety hazards.
- Sealing the structure before fumigation is the law.

### *How do I seal the structure?*

Various materials are available, including plastic (4 mil or thicker is best), duct tape, expanding foam, and caulk. If you think you will need to fumigate, seal all cracks and crevices before you load the commodity into the structure. Every step you take to seal potential leaks and allow the gas to be distributed throughout the enclosure will improve effectiveness.

### *Should I use tablets or pellets?*

Aluminum phosphide is packaged as tablets about $^5/_8$ inch in diameter, as pellets about $^3/_8$ inch in diameter, or as granules in a sachet or small, porous bag. Tablets release about five times more phosphine gas than pellets release. At high temperatures, it may be safer to use tablets because they break down slower than pellets. If you are fumigating a raw agricultural commodity, you can use tablets or pellets, without removing the residue. For processed commodities, prepacs, ropes, or blankets, keep the residue within the packaging so it can be removed after the fumigation.

### *How much aluminum phosphide do I need?*

The applicators manual recommends different amounts for different structures. The maximum dose is 900 pellets or 180 tablets per thousand bushels (725 pellets or 145 tablets per 1,000 cubic feet). Since phosphine gas diffuses to an equal concentration within the structure containing it, volume (cubic footage, Figure 1) is usually a better way to calculate dosage than the number of bushels. For example, if you have 2,000 bushels of wheat in a 6,000-bushel bin, calculate the dose for 6,000 bushels because the gas will spread throughout the structure. An

(A) For a flat structure such as a boxcar or truck trailer or a rectangular pile of the commodity:

| cubic feet | bushels |
|---|---|
| length x width x height | length x width x height x 0.8 |

(C) For a conical mound of grain:

| cubic feet | bushels |
|---|---|
| height x 1.05 x r x r | height x 0.84 x r x r |

r = radius = diameter divided by 2; or
r = radius = distance around the bin divided by 6.2

(B) For a cylindrical structure such as a tarped grain mass in a bin:

| cubic feet | bushels |
|---|---|
| height x 3.14 x r x r | height x 2.51 x r x r |

r = radius = diameter divided by 2; or
r = radius = distance around the bin divided by 6.2

(D) For the total volume of a cylindrical grain bin with a cone-shaped roof:

Use height 1 to calculate the volume of the cone-shaped roof as in C, and use height 2 to calculate the volume of the cylindrical part as in B. Add the two volumes to get the total volume.

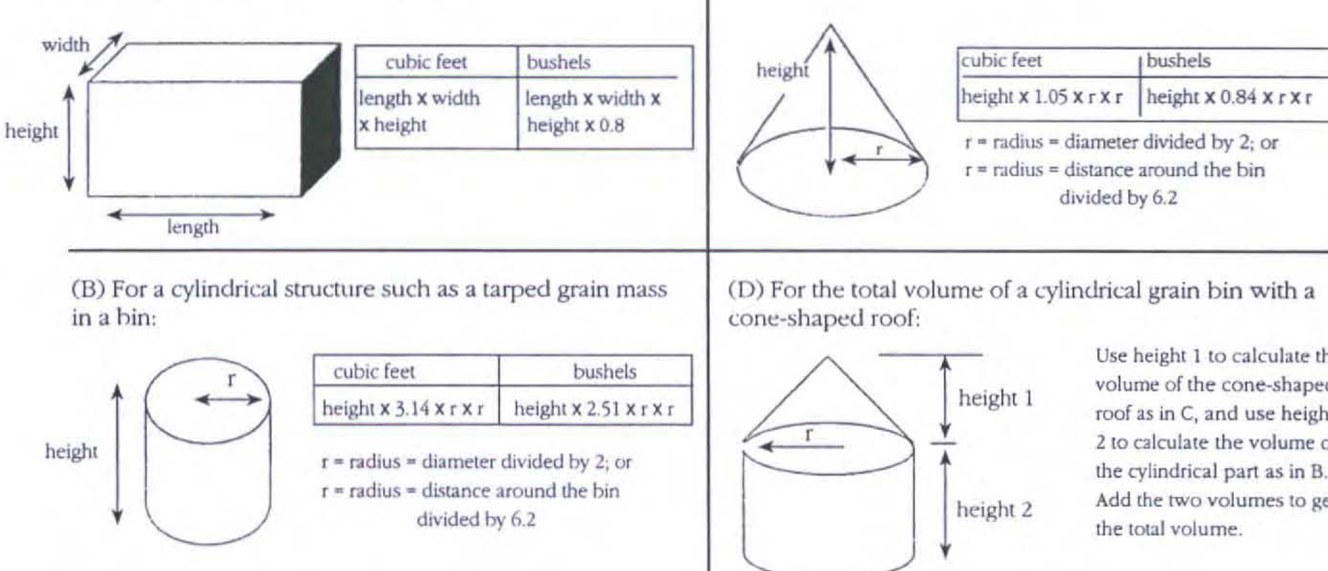


**Figure 1.** Calculating the volume of the structure to be fumigated. Make size measurement in feet.

exception would be if you placed a plastic tarp over the top of the grain to keep the gas within the commodity, then you would calculate the dose for 2,000 bushels. Dosage depends not only on the volume of space to be fumigated but on the temperature, the commodity, the moisture content of the commodity, and how well the structure is sealed.

### *How long does it take to fumigate?*

Do not rush the fumigation. You must give the gas time to build up to the concentration needed to kill insects (Figure 2). Respiration rates of insects are much slower than those of humans, especially in cooler temperatures. Only minutes of exposure of a given concentration of phosphine can be very dangerous to humans while the same concentration may take days to kill insects. Phosphine gas concentration also depends on temperature. It takes at least 2 days for the pellets to break down when the temperature in the structure is above 68 degrees F. It takes about a day longer if you are using tablets. The cooler it is, the longer it takes (Table 1). Then, it can take up to 2 days to aerate the product after the fumigation. Many professional fumigators like to see gas concentrations of 200 to 300 parts per million for a minimum of 3 days. Not allowing enough exposure time can be a waste of money, but, more importantly, it can be very dangerous because the solid fumigant may not have completely broken down when the commodity is moved and people are then exposed. Partially spent fumigant, called greendust, will continue to give off gas and may create a significant hazard to anyone near the commodity. Special procedures are needed to dispose of greendust. They are discussed in detail in the applicator's manual.

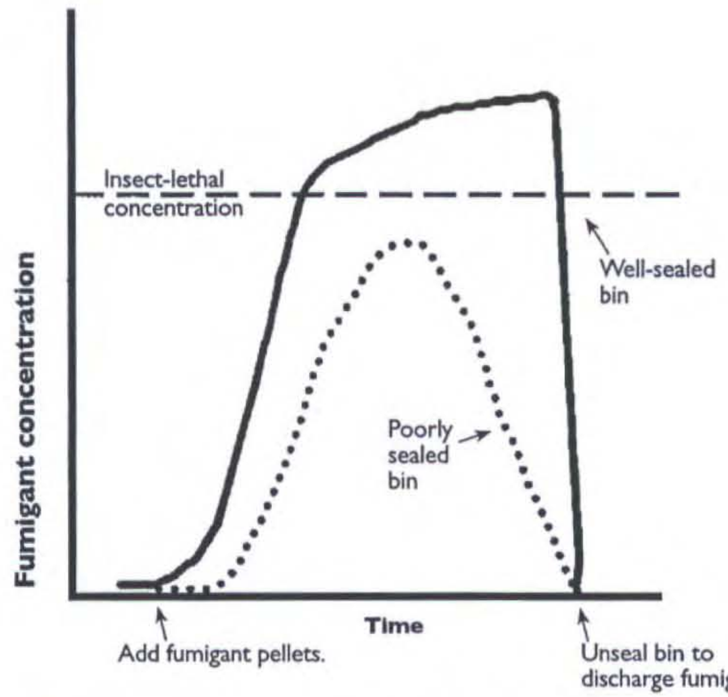


**Figure 2.** Fumigation failure in grain bins is often caused by poor sealing.

### *How do I apply the fumigant?*

The applicator's manual provides tips for how to fumigate farm bins, flat storages, rail cars and other transport vehicles, vertical storages, mills, food processing plants and warehouses, tarped commodities, barges, small sealable structures, beehives, and in-transit ship holds. This includes where and how to place the fumigant. Too much aluminum phosphide in any one spot can lead to fires and explosions.

### *How long do I have to apply the fumigant in the grain bin (peanut warehouse, etc.)?*

It depends on the temperature, the moisture in the air, and the volume of air in the headspace. The only way to be sure is to have an air monitoring device (see below) to make sure the gas concentrations are below safe levels. It is most dangerous to apply the fumigant on a hot, humid day. In an experiment on a hot day in South Georgia, six pellets left confined in a 30-gallon garbage can generated 50 ppm of gas in 5 minutes and 200 parts per million in 40 minutes.

**Table 1.** Temperature and Minimum Length of Exposure Time Needed to Fumigate With Aluminum Phosphide*

| Temperature | Pellets (0.6 g) | Tablets (3 g) |
|---|---|---|
| 40°F or below | Do not fumigate | Do not fumigate |
| 41 to 53°F | 8 days | 10 days |
| 54 to 59°F | 4 days | 5 days |
| 60 to 68°F | 3 days | 4 days |
| above 68°F | 2 days | 3 days |

*Allow longer exposure periods for taller storage structures. A rule of thumb is to add 24 hours for every 10 feet of vertical distance in tall structures such as grain silos. Commodities with a low moisture content, such as grain with less than 10% moisture, should be given a longer exposure period—24 hours for each 0.5% under 10% moisture. Adapted from Phostoxin Applicator's Manual, DeGesch America, Inc.

***I can smell the gas, can't I, and know when to get out?***

No. Phosphine gas has no odor. The garlicky smell is the result of a different chemical reaction. Although it is an exposure indicator, you can't always depend on the smell.

## General Safety Considerations

During a fumigation procedure, observe the following safety rules in addition to the rules specifically relating to fumigation.

- Wear a safety belt or harness equipped with a properly fastened lifeline if the commodity is more than waist high in the storage structure.
- Always have someone stand outside the storage structure in case of an emergency.
- If a storage structure has a ventilating fan, turn on the fan to thoroughly ventilate the structure before anyone enters.
- Do not allow anyone inside a confined-space storage structure while the commodity is being added or removed.

## Fumigation Safety Rules

Phosphine fumigants are valuable tools as long as they are used properly. Read and follow all instructions on the label, including the applicator's manual to ensure a safe and effective fumigation.

Store all containers of fumigant under lock and key, and keep a careful inventory so each container and package is accounted for. If you discover that any fumigant has been stolen, you are required to report the theft immediately to your local law enforcement authorities. Make sure the storage area is properly placarded as a pesticide storage area. The applicator's manual specifies what must be on the placards for an area where phosphine fumigants will be stored. Never store fumigants inside a home or in any structure where humans or animals live. Just-in-time delivery of exactly the right amount of fumigant is the safest practice.

If you have to transport fumigants, keep the container(s) locked in a metal box in your truck bed. If you transport large quantities on a regular basis, you may want to consider a security system like the one in Figure 3. The applicator's manual lists the hazards associated with transporting aluminum phosphide. Be aware of these hazards and have a list of them with you in the truck. Your truck will need to display a placard providing information about aluminum phosphide. If you are carrying less than 46 pounds of fumigant, you may be eligible for a placarding exemption, such as exemption DOT E 11329 (http://hazmat.dot.gov).

Make sure all employees know about the fumigation and are aware of potential safety hazards and emergency procedures. Make a list of the telephone numbers and addresses of the nearest fire department, rescue squad, hospital emergency room, and police department, and notify each agency of the fumigation ahead of time. Include on the list the names and telephone numbers of all appropriate personnel in charge. Provide each agency with a copy of your fumigation management plan and any other information needed in case of an emergency. This information should include the Material Safety Data Sheet (MSDS) for the phosphine fumigant used and a copy of the label, including the applicator's manual. There may be local requirements in addition to those in the applicator's manual. As you work your way through notifying the above agencies, you may learn of additional requirements. Accidents involving aluminum phosphide are rare – but in case the worst happens, a well-informed emergency response team would have a greater chance of saving your life than one that has not been informed about the hazards of aluminum phosphide.

A certified applicator is someone who has passed a state exam. Individuals receiving specific instructions in documented training sessions are classified as trained applicators. One certified applicator and another trained person are the minimum personnel required when aluminum phosphide is applied. Two trained people can

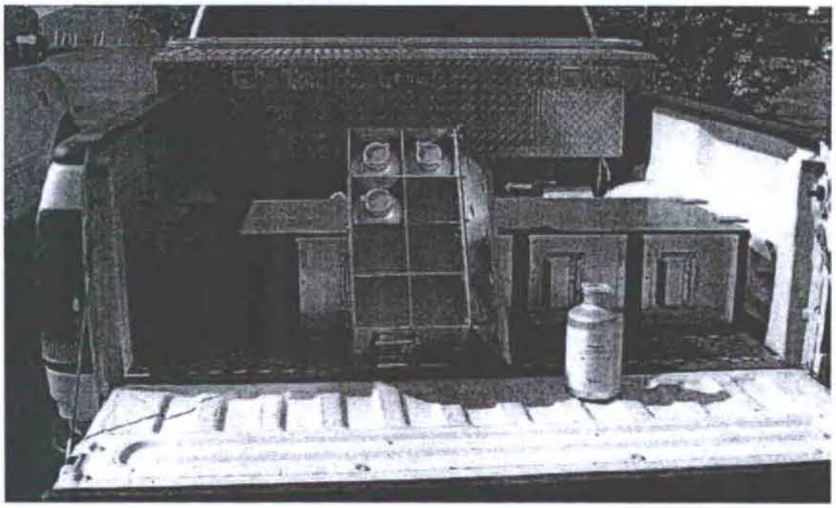

**Figure 3.** A safe storage box for transporting flasks of aluminum phoshide.


**Figure 4.** Hand-held, digital, continuous exposure meter used to monitor the concentration of phosphine gas.

legally make the application, as long as they are under the direct supervision of the certified applicator. All should carry some form of communication device, such as a radio, a walkie-talkie, or a cellular phone. See the applicator's manual for requirements after the application.

You cannot follow label instructions without knowledge of the phosphine gas concentration during the fumigation process. One possible exception would be an isolated farm bin location on private property (see sections 10.3, 18.1, and 22.1 in the applicator's manual). The label requires that you keep a log showing phosphine gas concentration at key locations surrounding the structure. The type of respiratory equipment used depends on the gas concentration. Furthermore, it makes sense to monitor the gas inside the structure (using extension hose from a safe outside location) to make sure an insect-lethal concentration of gas is present. Information about air-monitoring equipment is available from fumigant manufacturers and distributors. Safety equipment catalogs also provide valuable information and help in choosing the appropriate equipment. Two methods are commonly used to monitor the concentration of phosphine gas in the air. One method is using a hand-held continuous exposure meter with a digital display (Figure 4). This meter may be able to monitor gases other than phosphine. A monitor that can detect oxygen, lower explosive limits, phosphine gas, and carbon monoxide could be very useful on the farm. The second method consists of using tubes that change color to indicate the phosphine gas concentration (Figure 5). These tubes are used with a special pump that draws a sample of air through the tubes. The farther the color goes along the tube, the higher the gas concentrations. Different kinds of tubes are used to indicate different gas concentrations, so each type of gas requires a different tube. Low-level detecting tubes for concentrations from 0.15 to 5 parts per million (ppm) are suitable for most uses. Extension hoses are available so inside air can be sampled from outside.

If you will be applying the fumigant from within the structure, you must have some form of respiratory protection on site to follow label instructions. Use approved respiratory protection when the gas concentration is above the permissible exposure level of 0.3 ppm (as an 8-hour time-weighted average) or 1.0 ppm (15-minute short-term exposure limit).

All respiratory protection equipment must be models approved by the National Institute for Occupational Safety and Health/Mine Safety and Health Administration. Half-mask, dual cartridge respirators used for many pesticides and organic vapors are not suitable for use with phosphine gas. A full-face canister gas mask (Figure 6) can be used at gas concentrations from 0.3 ppm to 15 ppm (for example, NIOSH/MSHA prefix TC-14G). Be sure to use canisters designed to filter out phosphine gas. These canisters are typically color-coded olive green with an

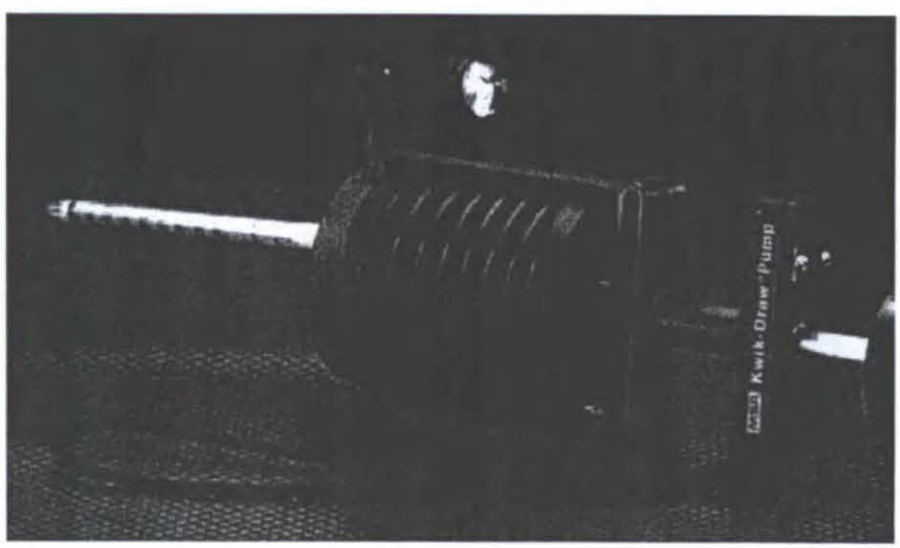


**Figure 5.** Gas-monitoring tube used to measure the concentration of phosphine gas.

**Figure 6.** A canister gas mask must be worn when the concentration of gas is higher than 0.3 ppm and less than 15 ppm.

orange stripe. If the concentration is above 15 ppm or if the phosphine gas concentration is unknown, use a self-contained breathing apparatus (SCBA).

The gas mask or self-contained breathing apparatus must fit the face properly. Any gaps that allow in unfiltered air will make the respiratory protection useless. Facial hair can interfere with the proper fit of a mask. A canister gas mask or self-contained breathing apparatus must be available on site when phosphine fumigant is applied from inside any enclosure. If air-monitoring equipment is not available on a farm, an approved canister gas mask must be worn during an application from within the structure.

Wear dry cotton gloves and body-covering clothing while applying the fumigant, and after fumigating, aerate the gloves and clothing before laundering them. Wash hands thoroughly after using phosphine fumigants.

Keep all containers tightly closed until it is time to apply the fumigant. Then it is a good idea to open the fumigant containers in the open air or near an exhaust fan. Otherwise, the accumulated gas within the canisters may provide an alarmingly high concentration of gas in the breathing zone during the fumigation. To open the container, invert it several times, point it away from the face and body, and slowly loosen the cap. Do not open the containers in a flammable atmosphere. Dispose of empty containers according to label instructions.

Do not allow the aluminum phosphide to contact liquid water, and do not leave aluminum phosphide pellets or tablets in piles because doing so interferes with the proper release of the phosphine gas. It also increases the risk of explosion or fire should the pile be suddenly exposed to water. Fire or explosion can occur if phosphine gas concentration exceeds 1.8 percent. The gas is corrosive to copper, brass, and precious metals, so electric and electronic gear should be protected from exposure or removed.

Post warning placards on all entrances to structures under fumigation. Placards must be weather proof. They can be handwritten, but they must include specific information. See the applicator's manual for details. Remove placards only when the gas concentration is 0.3 ppm phosphine gas or less. Make the structure under fumigation as secure as possible by putting locks on the entry points. If there is a fence surrounding the structure, make sure that the gate is locked. A security guard may be required under extremely sensitive conditions, such as in the middle of a town.

## Fumigating Using a Closed-Loop System

Although phosphine gas tends to penetrate deep into large volumes of stored commodities, its ability to evenly distribute itself does have limits. The following are some factors that would inhibit even distribution:

- Leaks that release the fumigant from the structure as fast as it diffuses within the structure
- Insufficient dosage for the

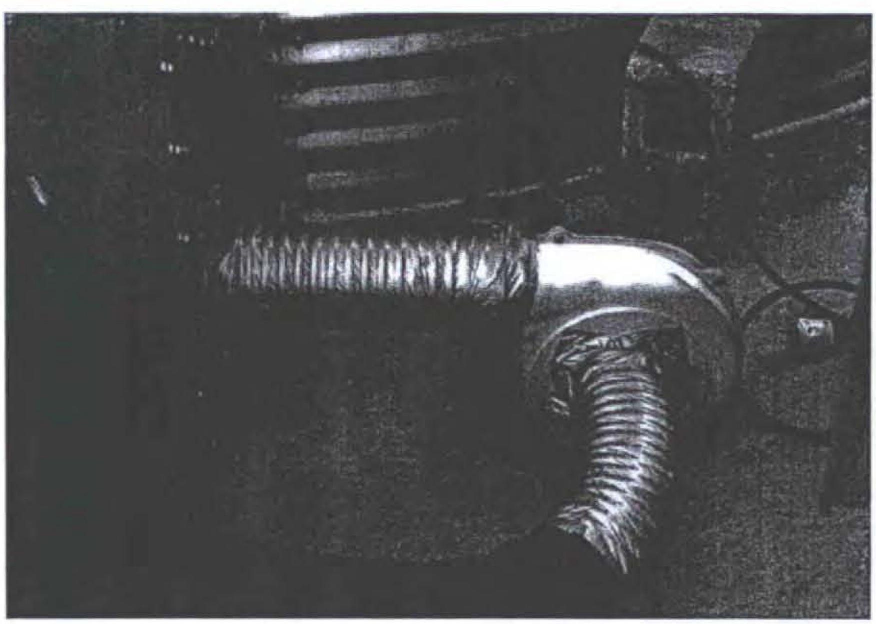

**Figure 7.** In a closed-loop fumigation system, a pump pushes the gas into the bottom of the grain bin.

volume being fumigated

- A tightly packed commodity with minimal airspace (such as a warehouse full of bagged or other packaged material or a farm bin with excessive amounts of fine particles and dust mixed with grain)
- Low temperatures resulting in the slow release of phosphine
- Large-volume structures with no means of application other than shallow probing or surface application

When any of these conditions exists, insects may be killed in one section of the enclosure and not in another. One way to deal with the problem of uneven distribution is to use a closed-loop fumigation system (Figures 7 through 9), which improves the distribution of phosphine gas within an enclosure. It involves the use of a tubing system and a blower to continuously recirculate the phosphine gas during the fumigation period. The system can be designed in a number of ways, but, for most situations, using 4- to 6-inch-diameter PVC pipe and flexible, solid drain tile is an inexpensive way to move gas from one point to another along the outside of the structure. The system should be designed to draw the gas from the headspace of the bin and reintroduce it under the false floor. Place a blower at a convenient point in the system. Usually a 0.25- to 1.0-horsepower motor is adequate. Proper sealing of the structure is even more critical with closed-loop fumigation since recirculation may speed up the escape of gas. Make sure all joints between sections of tubing and all entry and exit points are well sealed with duct tape, caulking, or other means. Place all tubing away from high-traffic areas, and protect it to prevent accidental damage. Test the system for leaks before applying aluminum phosphide.

Closed-loop fumigation systems are usually not necessary in small (less than 5,000 bu) tightly sealed bins. Advantages of closed-loop systems increase with the size of the bin since even distribution of the fumigant becomes more important. Closed-loop systems eliminate the need for labor-intensive and potentially dangerous probing operations or for moving grain from a full bin to an empty bin for the sole purpose of fumigation. Closed-loop systems can be safer than probing operations because the fumigant can be applied to the top of the grain so workers are not required to be inside the structure as long. Gas recirculation can reduce exposure time to as little as half the time required for some fumigations. Although there is an initial cost for a recirculation system, increased fumigant efficiency and lower dosages will usually pay for these costs in 1 to 4 years, depending on the size of the system and the frequency of fumigation.

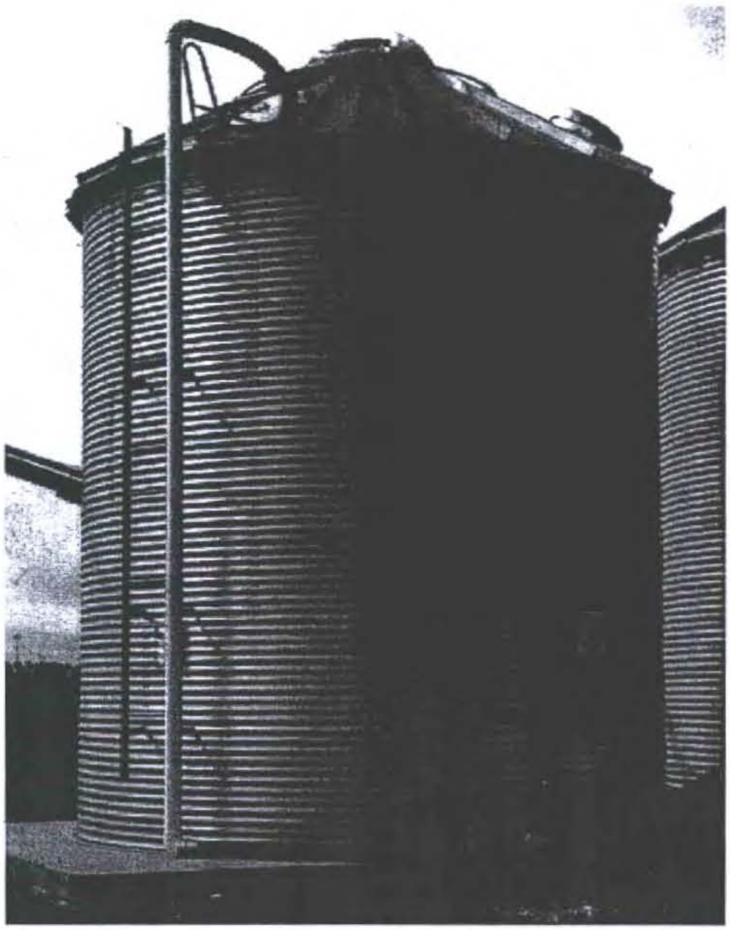

**Figure 8.** The gas is pumped up through the bin and then pulled down through a pipe running along the outside of the bin.

## Fumigating Transportation Vehicles

Ocean-going vessels can be fumigated with phosphine fumigant in transit, as can rail

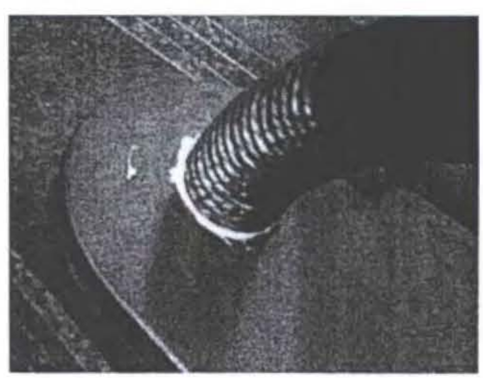

**Figure 9.** Here the gas leaves the bin at the top and is drawn back down through the pipe.

cars and containers, trucks, vans, and other transport vehicles shipped piggyback by rail. However, it is **not** legal to fumigate trucks, trailers, containers, vans, or other vehicles as they are being moved on public roads or highways. The fumigation must be completed and the placard removed following aeration before the vehicle can be moved.

## Ventilating the Structure after Fumigating

After the appropriate exposure period, ventilate the structure as thoroughly as possible before reentering it. If the structure is a building, open roof vents and several doors from the outside to create a stack action, releasing most of the gas to the upper atmosphere. If the structure is a grain bin or silo, open the necessary vents and run the aeration fans. If you have to enter the structure, wear respiratory protection until the air-monitoring equipment indicates that the concentration of phosphine gas is less than 0.3 ppm (8-hour TWA) or 1.0 ppm (15-minute STEL). Finished foods and feeds that have been fumigated with phosphine must be aerated for 48 hours before being offered to the end consumer. An alternative is to analyze the commodity to prove that the phosphine residue is less than 0.1 ppm in animal feed, 0.01 ppm in processed foods, or 0.3 ppm for nonfood items.

## Important Reminders

All fumigants are dangerous, and their use requires specific training. All fumigants are restricted-use pesticides for application by trained and certified pesticide applicators only. This publication is intended to assist applicators who meet these requirements. It is always advisable, however, to consider using the services of a professional commercial fumigator to reduce both risk and liability.

Use fumigants according to the directions on the label. Follow all directions, precautions, and restrictions that are listed. Do not use fumigants on commodities or sites that are not listed on the label.

The fumigant rates listed in this publication are recommended only for those fumigants registered with the Environmental Protection Agency and the pertinent state department of agriculture. If the label is cancelled or changed, the information contained herein is no longer recommended.

## Additional Information

A video is available on the fumigation of on-farm grain bins. It is available on DVD or VHS. In Alabama, you can obtain a copy of this video from your regional agronomy agent of the Alabama Cooperative Extension System. Copies can also be obtained, at a cost of $15, from the Publications Distribution Office, Alabama Cooperative Extension System, Room 6 Duncan Hall, Auburn University, Alabama 36849. Make checks payable to the Alabama Cooperative Extension System. This video is available with a high-speed Internet connection at http://www.aces.edu/extcomm/satellite/fumig.wmv.

**Kathy Flanders,** *Extension Entomologist,* Associate Professor, Entomology and Plant Pathology, Auburn University; and **Steve Brown,** *Extension Entomologist,* Professor, Entomology, Georgia Cooperative Extension Service, University of Georgia

Figures 4, 5, and 6 are courtesy of IFC, Olathe, KS.

Use pesticides **only** according to the directions on the label. Follow all directions, precautions, and restrictions that are listed. Do not use pesticides on plants that are not listed on the label.

The pesticide rates in this publication are recommended **only** if they are registered with the Environmental Protection Agency and the Alabama Department of Agriculture and Industries. If a registration is changed or cancelled, the rate listed here is no longer recommended. Before you apply any pesticide, fungicide or herbicide, check with your county Extension agent for the latest information.

Trade names are used **only** to give specific information. The Alabama Cooperative Extension System does not endorse or guarantee any product and does not recommend one product instead of another that might be similar.

**For more information,** call your county Extension office. Look in your telephone directory under your county's name to find the number.



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